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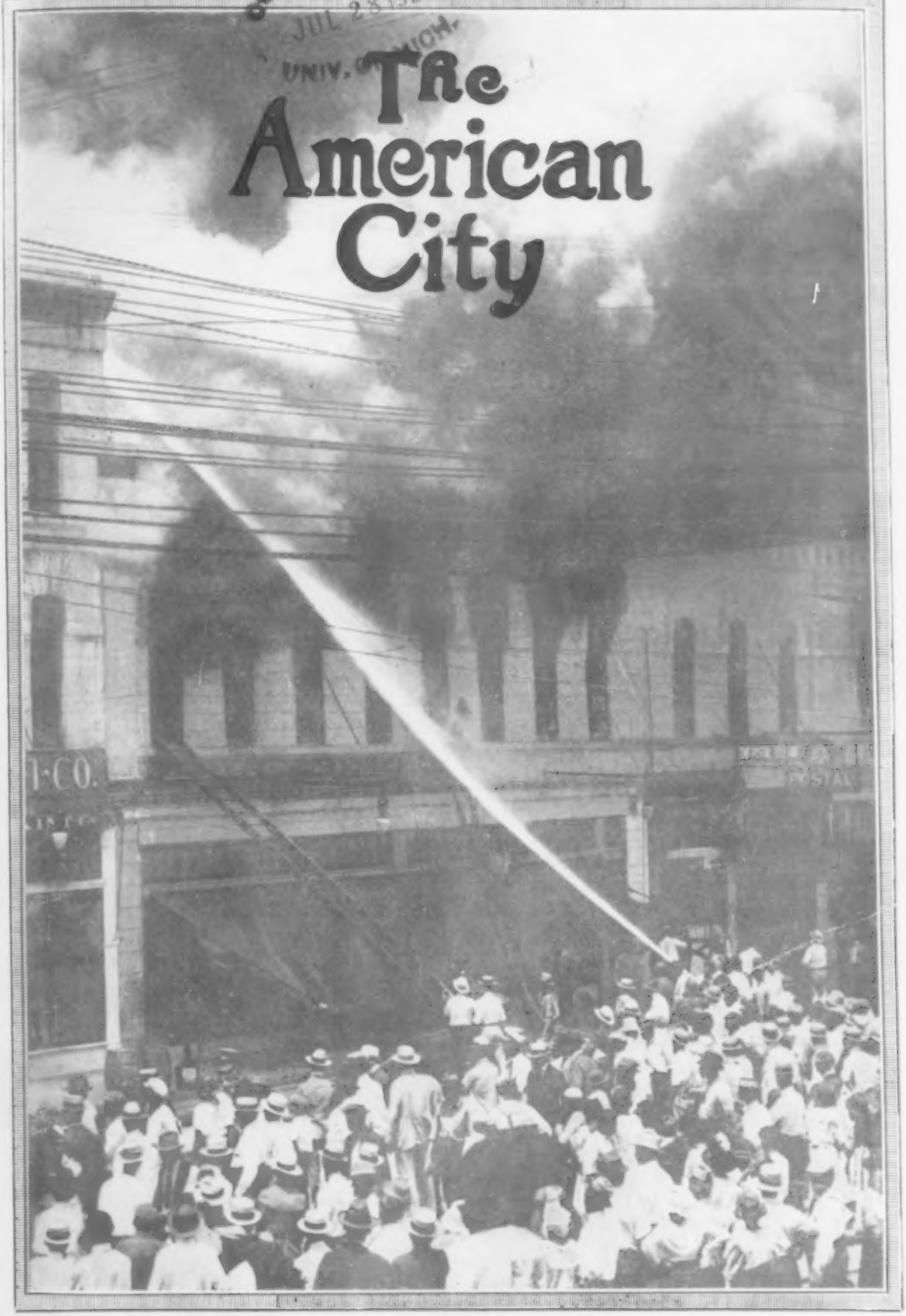

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The American City

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City Edition and Town and County Edition of The American City Now Consolidated

The increasing community of interest between cities and the near-by towns and villages has created a desire on the part of very many readers of THE AMERICAN CITY for the information contained in both the City Edition and the Town and County Edition. The result has been a growing demand for one edition of the magazine which will combine the reading matter heretofore published in the two editions.

After careful study of the situation and with due consideration of the wishes of the majority of our readers, it was decided to consolidate the City Edition and the Town and County Edition, beginning with this issue. Subscribers who have heretofore been receiving both editions will receive the same material in the new combined edition, and readers who have been taking only one edition will not only receive the material in which they are especially interested, but will also have available the additional reading matter formerly included in the other edition. The subscription price of the combined editions will be $4.00 per year in the United States, $4.50 to Canada and $5.00 to foreign countries.

The Providence Mosquito Campaign

The Valuable Results of Efficient Organization Methods

By Henry E. Childs
Chief Inspector, Providence, R. I.

THE experience of a seven years' campaign for the extermination of mosquitoes in Providence, R. I., has shown the propriety of using a number of principles and methods that have been outlined in earlier papers, but certain modifications of procedure have proved so valuable that a statement of the Providence methods of solving a rather complex problem will be of value.

Malaria-bearing mosquitoes were responsible for arousing the interest of the Health Department. In 1901 and 1902 the City Bacteriologist, Professor Frederic P. Gorham, and the Superintendent of Public Health, Dr. Charles V. Chapin, made an investigation of breeding-places and experimented a little with oiling.

In 1914 an appropriation was secured for active mosquito control operations. The general policy of oiling all potential breeding-places and of doing a little permanent drainage continued through 1918. The most radical change came in 1919 when it was decided to follow the example of other communities in basing all oiling and drainage operations upon reports of inspectors made at short intervals throughout the season.

The Problem in Providence

The topography of the city is varied. Outcropping rock ridges prevent easy drainage in some places. In glaciated regions the natural drainage systems are blocked. In other portions of the city meandering streams have broad margins of swamp. The situation is further complicated by the fact that just outside of the boundaries of the city on three sides there are very extensive and prolific mosquito hatcheries.

The solution of the problem is three-fold. Permanent improvement was accomplished by ditching, draining and filling. Temporary work consisted of treatment of the natural breeding-places, swamps, pools and margins of streams; of caring for public and private catch-basins; and of elimination of the numerous minor breeding-places in barrels, cans, tree-holes, puddles, gutters, etc. Extension work has been done in two ways: by actual work done by Providence mosquito men outside of the city, and by the stimulation of neighboring communities of the Metropolitan District to do work for themselves in coöperation with Providence. The conduct of the campaign that led to success in inducing independent effort on the part of neighbors makes a fascinating story in itself.

Engineering Projects

The bulk of the drainage operations has rested upon simple principles that are well understood. Very often a short stretch of ditch dug by the oiling gang was sufficient to drain some small swamp or to concentrate the territory to be oiled. At other times coöperation with the sewer department led to the ditching of a larger area, the connection with some open drain, or with a city storm sewer. The straightening of the Moshassouck River aided the mosquito campaign, although it was done under the auspices of the Commission on River Pollution to remove accumulated mud and sewage sludge.

During the past year drainage was done at Pleasant Valley Parkway, Fields Point, on the grounds of the State Home and School, in the rear of the ball park, and in the pond regions just over the line in Cranston. Filling was done at Whipple Street. I wish to speak of the work done at the Cole-Rochambeau woods in 1918 and at the Moshassouck in 1916, because they are typical of different sorts of natural breeding-places.

The Drainage of Pleasant Valley Parkway

The Pleasant Valley Parkway is a small park in one of the better residential portions of the city. Prior to the first mosquito control work, the residents of the district were severely annoyed by insects that had bred there. At the head of the

park was a large pool with swampy borders in which mosquitoes bred prolifically. The pest had been kept in check only by continuous supervision and frequent oiling.

A city sewer runs through the parkway. A hundred feet of trench was dug, and 18-inch pipe was laid to the deepest portion of the pond. After the partition was removed, the water ran down to a storm sewer and from there passed underground and out of the way. The pond was entirely emptied of water with the exception of that brought in by a sluggish brook that had fed it. A new course was dug for this brook which took it directly to the sewer without passing through the pond hole. That course was more direct, and a better grade was established so that there was an even and rapid flow of water to the sewer.

LAYING THE PIPE LINE WHICH DRAINED THE PLEASANT VALLEY PARKWAY POND, SEEN IN BACKGROUND

Fields Point Salt Marsh Removed

At Fields Point the conditions resembled those of the New Jersey marshes. The low-lying brackish swamp was the one source for the salt marsh mosquito, Aëdes sollicitans, within the city's district. Main ditches were put in which ran direct to the waters of Narragansett Bay. Smaller laterals were added. The standing water was limited entirely to the ditches by this method, and most of the water ran off.

The turf and peat were so soft that it was possible to make use of the New Jersey trick of sawing out the ditches with a hay saw. By the use of this saw it was possible to obtain straight ditches with clean-cut vertical walls. The material could then be lifted out in chunks and the bottom of the ditch leveled so that a direct and smooth flow of water was made possible.

The Whipple Street Pond

This pond lay in a kettle hole in a group of sand moraines. There was no satisfactory manner by which it could be linked up with any running water. In view of the nature of the glacial material deposited about the pool, it was decided to fill it in. Drag shovels were used, and the neighboring hills were cut down and the material dragged inward until the pond had disappeared.

Unfortunately, this method is not applicable in the cases of some others of the ponds because of underlying rock or of dense tree growth.

The Cole-Rochambeau Woods

The woods known as the Cole-Rochambeau woods may be taken as a type of the wooded swamp that is frequently met in and around Providence. Throughout the woods

there were numerous small open pools, most of them shallow but sometimes connected with one another for considerable distances. The trees, bushes and greenbrier were in themselves sufficient to discourage anyone from going very far into the swamp during the wet season of spring. The mosquitoes in there were enough, even in daylight, to worry a bird-lover poking through there after thrushes or warblers. This was just the sort of habitat suited for the early wood mosquito, Aëdes sylvestris.

To keep this region under control meant considerable work. Oil does not spread so readily where there is any underbrush, grass, reeds or débris to catch it. The oiling of these woods was therefore necessarily preceded by considerable clearing away of brush to let the oil spread. Puddling took more than the normal amount of time. A rain might spoil the work almost as soon as the oil had been laboriously spread. As this was situated along a boulevard, it was rather urgent that the swamp be eliminated.

After the oiling gangs had finished their work for the summer they were put to work digging a long ditch lengthwise of the swamp. To this some laterals were afterwards added. A conduit which had carried a brook had caved in and clogged up. At an expense of $240, a drain was lowered so that the water collected in the main ditch could be carried off.

Organization

Mosquito control work is done under the auspices of the Department of Health. The City Bacteriologist, Professor Gorham, is superintendent. He is generally responsible for the entire project. That involves immediate supervision over the laborers, considerable traveling about the city to keep in touch with the progress of the work, the planning of engineering problems, the formulation of the general policy from year to year, and the prosecution of educational publicity.

Inspection was performed in 1919 by a chief inspector and several assistants. There were several part-time inspectors in the spring, seven full-time men in June and July, and but five full-time men later.

Oiling was done by oiling gangs made up as follows: In the spring there were two gangs consisting of a foreman and two laborers each that oiled swamps. Another gang was used for oiling catch-basins alone. Here there were a foreman and four men.

Routine Procedure

All known breeding-places have been listed. A series of "route cards" has been made from them. On each card is a number, a brief description that serves to locate the place, a description of the character of the breeding-spot, and space in which a record can be kept of all inspections, results, recommendations for treatment, dates of treatment, and date of drying-up or of permanent removal of the breeding-place.

The chief inspector has a file of these cards. He issues duplicates of them to his inspectors, who are college students trained in biology. Each inspector is responsible for a given district, for which he holds the route cards, and to which he makes additions if possible. This district is to be covered completely at intervals of eight to ten days throughout the season. At the beginning of the season the inspector brings the route cards up to date by supplying new descriptions of each location. Using a white-lined cup or dipper, he looks for larvae or pupae. He recommends treatment of his places. He is expected to secure samples of larvae, to raise them in the laboratory, and to identify them so far as possible. Furthermore, he is sent out to investigate complaints from residents, hunts for minor breeding-places, and makes collections of adult insects at stated intervals at night. Hobnobbing with residents of his district, he endeavors to map out the distribution of adult mosquitoes and to trace them to their source.

The inspection system has been made the basis for the work in Providence. Daily reports of inspectors are used to plan out the routes of the oiling gangs daily. In the office of the chief inspector is kept a pin map which gives a bird's-eye view of the situation at any time. Different-colored pins are used to show the location of different kinds of larvae, the dates of oiling, and the distribution of adults. Much of the identification and mapping is done at night or on rainy days when field work is impossible.

Technique of Oiling

Each of the swamp gangs of oilers has a machine to carry oil. The oil used is a

fuel oil from a parafine base. In oiling a swamp the foreman goes ahead carrying a pail of oil and spraying it upon the water by the simple means of a whisk broom. This has been found far more effective and less expensive than the use of special sprays, patent oil-cans or knapsacks. The oil can be flirted to a considerable distance and spread fairly well in this way. It is considered very essential that the sprinkling be followed by thorough puddling of the oil by the two laborers, who carry long-handled brooms for the purpose. This aids in getting an even coating of oil over an open surface, and is especially important when grass, reeds or bushes grow in the water. It is by the puddling action alone that the oil can be brought in between the stems and into the sheltered spots where the larvae are most abundant. Simplicity of apparatus and thorough, conscientious work are the essential factors in oiling.

A SWAMP IN WEBBING COUNTY AFTER DRAINING

Kerosene has been used, but it does not spread so well as the fuel oil and evaporates more rapidly. In grassy land it has been found advisable to prepare an emulsion just before applying the oil. It is diluted with an equal quantity of water and shaken thoroughly. The emulsion works down between reeds and grass stems that catch and hold the undiluted oil. The emulsion spreads better than the undiluted oil under any condition. It is planned to cover about 1,200 square feet of water with one gallon of oil, but in tangled undergrowth more oil is required.

The catch-basins are oiled regularly without any inspection. A driver looks after supplies and keeps records. Two men work on each side of the street. One opens covers of catch-basins and throws in some oil from a cup. His partner then puddles this with a long stick. The driver sees to it that all covers are replaced. There are some 6,000 public and over 200 private catch-basins in the city. The oiling gang moves slowly, so that a horse and wagon is found more economical than a machine.

At the end of the day the foreman reports on the time spent, the quantity of oil used, and the localities treated.

OILING GANG AT WORK IN COLE-ROCHAMBEAU WOODS BEFORE DRAINAGE

The Campaign of 1919

The general survey of swamps began March 17 and continued until September 20. Oiling and ditching began April 7. Catch-basins were first treated June 15. In July an intensive campaign was begun to eliminate the minor breeding-places throughout the city.

Early in the season

many complaints had been investigated, and the trouble was found to be in some minor breeding-place rather than in the pond complained of. During the intensive house-to-house campaign 390 minor breeding-places were found, and of them 294, or 60 per cent, contained larvae. In most cases the residents were amazed to find the insects developing in their own dooryards. Larvae were found in short ditches, in puddles of rain-water, in the usual tin cans and other discarded receptacles, and in some other more remarkable places. The tree-hole proposition had been attended to in an earlier year. The tubs in which liquid manure was kept for the war gardens were frequently found responsible. Toward the end of the season they were all infested. Wrigglers were found in the gutters of the old Federal Building, but the prize goes to the inspector who finally solved the mystery of offending mosquitoes by looking at water standing in the radiator of an automobile. The cap had been left off inadvertently, a female Culex pipiens investigated, found the water to her liking, and some ten days later her offspring were making the owner of the machine suffer for his carelessness.

The suggestion of the chief inspector to inaugurate a "Clean-up-the-Yard Week" met with approval. The Providence *Journal* pushed the idea vigorously, with the result that property owners learned to assist in keeping their premises free from potential breeding-places.

As a general thing, the receptacle was destroyed when possible. The owner's approval was sought. In cases where the owner could not be reached, notices were left stating that mosquitoes were breeding and asking him to eliminate the trouble. Such notices were very effective. A small bottle of oil carried by the inspector was frequently called into play for some small quantity of water that could not be removed.

Night Collecting and Its Significance

The efficiency of the control work, the distribution of species, the relative abundance of species geographically and seasonally, and the course of invasions from outside the city limits were determined very largely by night work.

After June 4 the inspectors made regular night collections twice each week at assigned stations for a period of ten minutes at prearranged hours. The insects were caught in cyanide bottles and taken to the laboratory for study. From this study it was found that Culex pipiens occurred in isolated reports during April. During the first week in May Aëdes sylvestris was found in outlying districts. After May 24 it was abundant in the outskirts of the city. Until June 10 it predominated everywhere except in the East Side, where C. pipiens took first place. It practically disappeared by the first of June. By June 10, C. pipiens predominated in the outskirts with only a few A. sylvestris. It was last seen August 23. Of the malaria-bearing mosquitoes only one adult was found, Anopheles punctipennis, although larvae of both A. punctipennis and A. maculipennis were found in considerable numbers both within the city and in neighboring towns.

The most significant result showed invasions at particular times from the larva-hatcheries of north, south and east. The isomosquito lines showed very clearly the sources from which these invaders had come. Shifts in the invasions could be accounted for by the reports of direction of winds furnished by the Weather Bureau. The investigation showed unmistakably that Providence can never be free from mosquitoes until the communities on its borders take up the fight also.

From the record cards on file the following larval records were obtained: Aëdes sylvestris from March 21 to June 24; Culex pipiens from June 3 to October 18, although they have been found on December 24; Aëdes canadensis occasional during April; Uranotemia sapplurina August 2 and 15, but rare; both species of Anopheles in July and August, first on June 11. Aëdes triseratus and Culex territans were also recorded during the season. Aëdes sollicitans was not found this year, but it breeds in salt marshes farther down the bay.

Costs for 1919

The work has been done at very little expense. The increase in comfort and health has greatly exceeded the investment. The usual appropriation has been $8,000 annually. Last year an additional appropriation of $3,000 from the state made a total

of $11,000 available. It was apportioned as follows:

Superintendent's salary	$1,000.00
Inspectors	2,162.62
Laborers	4,463.82
19,780 gal. oil	1,690.05
Permanent improvements	431.87
Tools and incidentals	493.37
Total	$10,241.73

The cost of inspection was much greater because this year only those places found harboring larvae were oiled, while the previous policy had been to oil everything suspicious. That increased expense was more than compensated for in saving on oil and labor in applying oil.

Campaign for Extension

It has been pointed out before that extension of the control operations to neighboring cities and towns is essential to ultimate success in Providence. In 1916 there was a conference held in the city to which were invited representatives of the Metropolitan District. It is reported that they promised support, but none came.

The matter was reopened last year with greater success. Probably the most influential factors were the whole-hearted support of the Providence *Journal*, and the state legislation providing state aid.

A special reporter from the *Journal* staff was assigned to the mosquito campaign. For a period of some two weeks he had front-page stories daily that told of conditions in surrounding towns, gave interviews with men of prominence, and urged immediate action. For a considerable period the daily stories appeared elsewhere in the paper. Throughout the season the campaign was vigorously pushed. Clean-up Week was possible only through the *Journal's* aid. The campaign was backed by strong editorials, by cartoons, and by pictures.

Further publicity was given in departments of the same paper; from the health standpoint by Dr. Chapin in his weekly article, "Medical Facts and Theories"; and from a biological point of view by the writer in a nature study column in the Sunday *Journal*.

Professor Gorham spoke before the local medical and engineering societies and other groups of men. He was also active in supplying the ammunition for the *Journal's* attack, and coöperated in every way to get the neighboring communities into the field.

Mayors or town presidents, health officers, and engineers were invited to a conference called by Mayor Gainer of Providence. That brought the matter to a head and initiated the active campaign. At the same time a bill was introduced in the Legislature asking an appropriation to aid towns and cities actually engaged in mosquito work. That was later modified and became a law providing an appropriation, not to exceed $20,000, out of which sums equal to one-half of that spent by a city or town prior to July 1 would be appropriated, provided that no allotment should exceed $3,000.

This legislation encouraged the towns and cities that had been rather thoroughly prodded awake by the *Journal's* pointed remarks. Some small appropriations were made and a little work done, but procrastination was the order of the day.

The Future

Extension into the Metropolitan District was the keynote of the 1919 season. It must continue to be the best point of attack for Providence for years to come. She will have oiling to do indefinitely, but that will grow less as a few more large projects within the city are cared for. Then the fight must be carried on outside of the city's limits in coöperation with contiguous towns and cities. The Common Council has authorized expenditures to be made for work done outside of the city's limits. The season of 1919 gives promise of an extended district which shall be under mosquito control. There is prospect now of reaching a point where mosquitoes will be rare stragglers within the city.

ACKNOWLEDGMENT.—The author acknowledges assistance rendered by Professor Gorham through the loan of the unpublished 1919 report. The photographs are used by courtesy of The Providence Journal Company.

The Story of the Summit Street Extension, Toledo, Ohio

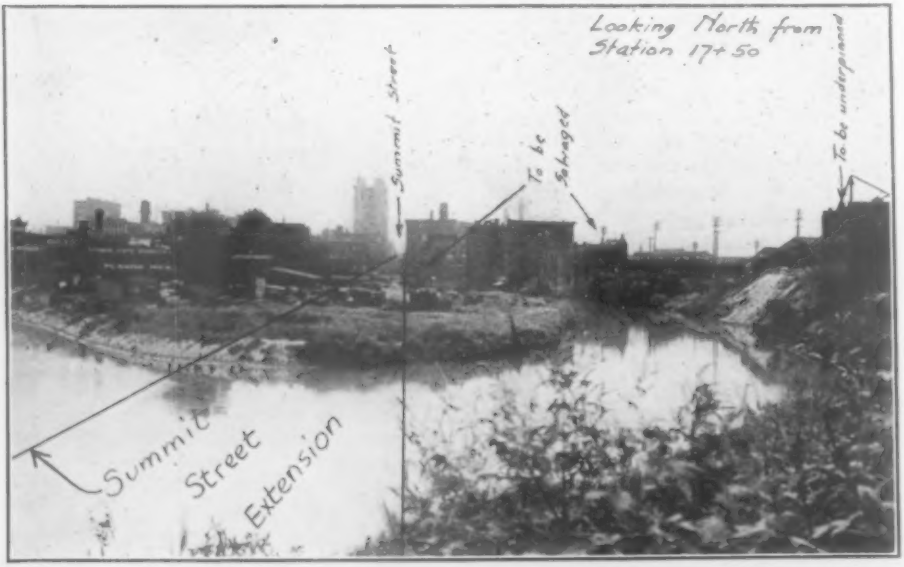
A Revision of Creek Channel and Street Lines Aids Traffic and Increases Value of Extensive Lands

By H. C. McClure
Commissioner of Engineering and Construction, Toledo

THE average city dweller is apt to give little special attention to the general arrangement of the street system of his city. He uses the streets, as they have been planned or dedicated by numerous persons in the past, with a sense of satisfaction if his way is direct and easy, but with a sense of irritation if direct and easy routes do not prevail.

A city, to develop to its best advantage, must have main arteries for all kinds of traffic leading to all sections. They are valuable for the cheap distribution of all kinds of merchandise, for quick and easy access of people to and from their homes, their places of employment and their places of amusement, for greater speed in fire and police work and in many other ways.

Toledo is unusually fortunate in having certain thoroughfares which are among the city's chief assets and have been important factors in its growth. A serious defect in the system, however, is the separation of the southerly portion of the city from the business district. Summit Street is one of the most important down-town business thoroughfares in Toledo. It is the logical route for an immense amount of traffic of all kinds, because of its location; together with its connections, it parallels the Maumee River for a distance of over 8 miles. A serious handicap to the proper development and the best use of this street has existed in the form of an old creek channel, known as Swan Creek, which in former years served as one of the termini of the Miami & Erie Canal. This creek has cut Summit Street off abruptly within a stone's throw of property worth many thousands of dollars per front foot, and has forced all traffic to seek a roundabout connection between the main business section and the



AN ACTUAL PHOTOGRAPH TAKEN LOOKING NORTH TOWARD SUMMIT STREET, TOLEDO, FROM A POINT WHICH WILL BE ON THAT THOROUGHFARE WHEN IT IS EXTENDED

PHOTOGRAPH SHOWING THE ROUTE OF THE STREET EXTENSION LOOKING SOUTH. THE NEW CHANNEL OF SWAN CREEK IS SHOWN IN PHANTOM AT THE LEFT

Union Station and up-river residential district.

The improvement of this street has been talked of for many years, but until the beginning of 1916 no systematic effort was made to push the improvement to completion. Since the beginning of 1916, the necessary resolution, plans, ordinances, bond issue, property agreements, state legislation, etc., have been completed and the contract awarded.

As the portion of Swan Creek affected was under control of the State Board of Public Works in charge of the state canals, it was necessary to effect the passage of acts by the State Legislature covering the exchange of canal lands. The matter was further complicated by the fact that considerable railroad land was necessary, and proper deeds and papers were required of the United States Railway Administration.

About 40 separate agreements were necessary with private property owners, involving the abandonment and destruction of a number of buildings used by various manufacturing concerns. In all, the legislative steps and the preliminary agreements necessary were unusually complicated and difficult.

Owing to the general nature of the improvement it was first decided to finance the work by a general bond issue. This did not, however, secure the necessary two-thirds vote, and the matter was then taken up by a group of business men, self-styled the Summit Street Extension Association. This group agreed to guarantee 50 per cent of the cost, to be raised as a direct assessment on the property benefited and extending for a distance of approximately one-half mile on Summit Street adjacent. The city's bonds were issued for the remaining 50 per cent.

In the abandonment of various streets and properties necessary in the work, the city will come into possession of approxi-

mately 300 feet of property, which is conservatively estimated to be worth at least $200,000.

What the Work Involves

The improvement consists of a relocation of the winding Swan Creek channel and the extension of the existing Summit Street from its present terminus in a straight line to a connection with an important thoroughfare near the Union Station site, known as Broadway. The work requires the removal and proper placing of approximately 130,000 cubic yards of excavation; the construction of a 150-foot section of concrete viaduct across a dead creek channel arm; the construction of a concrete retaining wall up to 45 feet in height, and the installation of two bascule bridges complete, with abutments and operating machinery. One bridge giving a direct connection with the freight terminals of four of the largest railroad systems entering Toledo will be a 40 x 80-inch single-leaf lift bridge, and the other will be a 80 x 80-inch double-leaf lift.

The estimated cost of the work in 1916 was given as $580,000 complete, including property damages. The contract which has just been awarded covers 90 per cent of the construction work, and over two-thirds of the damages have been settled. At present prices it is probable that the work will exceed the 1916 estimate by something like 10 or 15 per cent.

The contractors plan to carry on the work by first making the dry excavation cut by steam shovel, depositing the excavation by trestle work on the street extension without materially closing the present creek channel. They then plan to follow with a wet excavation cut of a channel approximately one-half of the required width, which will allow for an outlet for the creek flow just as soon as this cut is completed. They will then complete the channel cut, using the rest of the earth to fill the present channel. The installation of bridge abutments is to be carried on at the same time, so that the installation of the steel work will proceed just as soon as the street fill has been completed. The installation of the retaining wall and concrete viaduct do not in any way affect the navigation on the creek channel or the flood water flow, and these items are to be carried on independently and at the same time the excavation and bridge work is being done. It is expected that the entire work will be completed this year. It is then planned to install a temporary medina stone pavement on the street extension, to be followed by a permanent pavement as soon as the fill has settled sufficiently.

The improvement when completed will open a direct connection to the Union Station and to a large-growing up-river residential district. It will force a revision of the land values in the vicinity which will add at least one million dollars to the tax duplicate on increased land values alone. The possibilities of the improvement are very marked as the improved section is closely adjacent to the railway freight terminals of five of the largest systems entering Toledo. The property, vacant at present, will become the logical wholesale district. Already plans for two wholesale buildings are under way, and these will doubtless be under construction before the improvement is completed.

The benefits of the improvement will be apparent at such an early date that the long delay in bringing the matter to completion will be the only cause for comment. It is believed that this work stands alone as an improvement of its size which will so nearly finance itself in a very few years from the direct benefits made possible by the improvement itself.

What Is Being Done in Your City to Eliminate Grade Crossings?

It is estimated that there are over 200,000 railroad grade crossings in the United States and that about 2,000 persons are killed annually at these crossings.

In Nebraska there were, January 31, 1917, 6,516 miles of track, or 6,237 miles of operated line, with about 11,300 grade crossings, of which about 5 per cent have some form of protection. This means that in four miles of track there were seven grade crossings.—*Nebraska Department of Public Works, April*, 1920.

Tree Planting Plans for Michigan's Highways

By P. L. Buttrick

Assistant Professor of Forestry, Michigan Agricultural College, Lansing, Mich.

IN the past, American highway engineers have not always realized that a public highway need be anything more than an efficient line of communication. Happily, a somewhat larger conception is beginning to prevail, and attention is being focused upon the esthetic appearance of a road as well as upon its layout and surfacing. This view has been given a great impetus by the thousands of Americans who have returned from France with the memory of her superb tree-lined highways well fixed in their minds. These men realize fully the advantages of the highway beautiful as well as the highway efficient.

The esthetic improvement of a highway of course involves many factors outside the control of the highway engineer. He must confine himself to the right of way. By simple attention to cleaning up the public land on each side of the surfaced road, by taking reasonable care in grading to avoid disagreeable angles, unsightly piles of material, pits and the like, much can be accomplished. The grading and turfing and planting with trees and shrubbery of the unsurfaced portion of the right of way is a more positive measure. On the whole, the most satisfactory effects in planting are obtained from the use of trees. In many parts of Europe systematic tree planting along highways is considered a regular part of highway work.

The Great Opportunity

Actuated both by a wish to make the highways of Michigan attractive and by a full realization of the possibilities of systematic highway planting, the Legislature at its last session passed an act authorizing the State Highway Commissioner to plant shade, ornamental, nut-bearing, or other food-producing trees upon state trunk line highways or other highways within the state upon which state funds have been expended. The State Board of Agriculture is directed by this act to furnish to the Highway Commissioner lists of trees suitable for planting and to furnish planting plans for the work. The State Board of Agriculture, acting as the directing organization of the State Agricultural College, has directed the Forestry Department of the College to prepare such plans for the Highway Commissioner.

The opportunity for presenting a compre-

A WELL-PLANTED HIGHWAY IN MICHIGAN WHICH WILL BE DUPLICATED MANY TIMES OVER UNDER THE NEW PLANTING PLAN

hensive plan which shall take into consideration all the forestry, landscape, and engineering features of the subject is great, and the Forestry Department will endeavor to do justice to the large possibilities. Such a plan will go further than simply to decide upon the most economical methods of planting some hardy and fast-growing species of tree which has no other qualifications to recommend it. The latter course would merely fill the letter of the law and add far less to the beauty of the highways than a plan calling for the use of various species of trees according to their practical and esthetic value for certain classes of roads. It is designed to have landscape planting as well as simply tree planting.

Under this law the State Forest Nursery at the Agricultural College and that of the Public Domain Commission, both of which are organized to grow trees for forest planting in the state, are to furnish the Highway Commissioner with the necessary trees, and steps are being taken to produce the large amount of stock which will be required.

In the drawing up of the law the amount to be spent upon this work was left discretionary with the Highway Commissioner, who was heartily in favor of the work. After the law was passed, however, it appeared that under existing conditions of the high cost of labor and materials and the delayed program of construction due to the war, it would be unwise to expend any of the Commission's funds immediately for this work. Accordingly, the next session of the Legislature will be asked to make a separate appropriation for the work if it is still evident that the funds of the Commission are inadequate. Meanwhile the investigation and the organization have gone forward, and perhaps in the end little time will have been lost.

Certain other features of the law became immediately operative. One authorizes villages, townships, cities, and counties to expend money for highway planting. Another permits owners along certain classes of roads to plant trees under accepted plans, and for so doing to receive certain abatements of taxes. Still other provisions strengthen existing laws for the protection of shade trees on public thoroughfares.

Under these laws plus an enlightened public sentiment there is no reason why in a few years the highways of Michigan should not become as famed for their beauty as they are beginning to be for their utility.

Fire Prevention Window-Displays

By William J. Leonard
State Fire Marshal of Ohio

NO other feature of the recent clean-up campaign in Ohio's capital attracted so wide attention or engendered such deep thought as the fire prevention windows designed and trimmed by Glenn A. Beall of the Columbus Fire Department. Mr. Beall stuck strictly to the realistic, using in construction actual charred timbers, shingles, etc. The State Fire Marshal's Department, the Fire Department and the Columbus Chamber of Commerce coöperated in the campaign, the Chamber through a powerful Fire Prevention Committee and its auxiliaries.

One window was in a cigar store and was crammed full of half-burned matches (175,000) collected on the streets by the Boy Scouts. This window also bore slogan cards showing the damage done by matches. In order to stimulate interest, a prize was offered for the guess nearest the number of matches actually picked up and displayed.

Twin windows on one side displayed the dangers of the back yard, and here the ingenuity of Fireman Beall was especially brought out. Shingles that had actually been through a Columbus fire were used in "building construction," and dolls represented children playing with fire. Scenery was employed to give perspective. It was a horrible example of a back yard, and typical of hundreds actually in existence all over the country.

The other window depicted a clean house and yard, and in the picture taken of the display, Ohio's Capitol appears reflected by the window. This was not intentional, but it makes a pretty setting—the power of the

ONE OF THE STRIKING WINDOWS IN THE COLUMBUS FIRE PREVENTION DEMONSTRATION, DEPICTING THE POSSIBLE FIRE HAZARDS IN A BACK YARD

state keeping watch and ward over the homes of the commonwealth.

In still another window a littered, rubbish-laden attic was shown, with the question well displayed, "Is *your* attic like this?" The hazards of kitchens were also depicted.

In another window was an old hand fire engine, and cards showing the necessity of rigid inspection and of a fire prevention bureau to be part of the fire department.

All day long and at night, too, crowds stood in front of these displays. They set the Columbus people thinking—especially the information conveyed by neatly lettered cards. The actual losses and the number of fires in the city due to the causes so aptly illustrated drove home to the sightseers the dangers that each second of the day or night confront the householder.

Merchants who were lukewarm at first over letting valuable window space go for such purposes say that never before in the history of their business had they such a run of customers. Others are clamoring for similar displays this fall.

From one prominent corner to another, especially during the busy hours, a complete fire alarm box was moved, and here Fireman Beall gave illustrations of "How to turn in an alarm." In two hours 1,400 alarm box glasses were broken, and 1,400 Columbus people, many of them women and girls, learned by actually turning the trick how to summon the department. A large map of the city, showing the location of the boxes, stood by the alarm stand, and fire alarm cards were passed out with the polite request, "Mark the location and number of *your* alarm station."

Next fall there will probably be one display window for every block in the high-value district.

The Property Loss from Fires

In the United States and Canada we have an average loss of $250,000,000 each year. These are big figures, and, unfortunately, are hard to be taken in—practically $500 a minute. Do you realize what this loss is and means? It exceeds the annual production of gold, silver, copper and petroleum A new fire starts every three minutes. There is a continuous conflagration. Men, women and children are fleeing for their lives before the Fire Fiend!

GETTING READY TO MAKE A FLIGHT FOR AIR SAMPLES IN CONNECTION WITH THE ATMOSPHERIC SURVEY, SALT LAKE CITY

The Salt Lake City Smoke Investigation

A Thorough Coöperative Survey of Causes and Remedial Measures Augurs Well for a Smokeless City

By Osborn Monnett
Consulting Engineer, Chicago, Ill.

DURING the last eight months an atmospheric survey of Salt Lake City, Utah, has been in progress for the purpose of determining the source and cause of smoke and for the working out of a systematic program for reducing it to the minimum.

Salt Lake City is located in the northeastern corner of the Great Salt Lake Valley, and is surrounded on all sides by a fringe of mountains, making the air movements over the city very slight indeed. During the early morning hours the wind direction is from the southwest, which has the effect of blowing all of the smoke into the northeastern part of the valley directly over the city. During the winter months the wind velocity averages not more than six miles per hour, which is not sufficient to carry away the smoke as rapidly as it is formed. During these periods of low wind velocity the accumulation of smoke over the city becomes very objectionable, and radical means are necessary to eliminate it.

Federal Coöperation

The investigation was conducted jointly by the city of Salt Lake, the University of Utah, and the U. S. Bureau of Mines. The engineers in the latter organization directed the work, which consisted of gathering data relating to fuel consumption, smoke density readings, and air filtrations to determine the extent and character of the atmospheric population. The coöperation of the Bureau of Mines was assured through a provision in the General Appropriations bill, by which the Bureau is authorized to extend aid to cities interested in smoke abatement, provided the city will furnish part of the funds necessary for the works. This marks a new era in such work. In the average city smoke abatement has been so bound up with local politics, that very little has been accomplished. It is a hopeful sign that in such strictly technical problems American cities can avail themselves of an independent agency such as a government bureau to work out a solution.

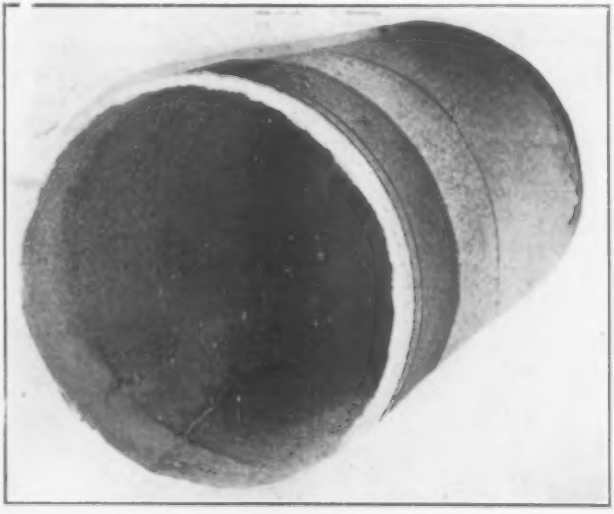
The results of the investigation show that in Salt Lake City large power plants make 40 per cent of the smoke; small heating plants 14 per cent; locomotives 16 per cent; residences 27 per cent; and miscellaneous sources 3 per cent; 510,000 tons of coal are burned in the city annually, and of this amount the residences consume 210,000.

The residence smoke was given special consideration, laboratory experiments being made at the University of Utah on domestic equipment, for the purpose of developing the best methods of firing local coals for smoke elimination. This equipment consisted of cook stoves, heating stoves, hot air furnaces, steam and hot water boilers and other similar types of equipment found in residences. The methods of firing consisted of the coking method, the alternate method, ordinary methods, and methods for starting a fire from the top, that is, throwing the fresh coal on the grate and building the fire on top of the fresh coal. The coal ignites readily and burns without smoke, getting up maximum heat in a shorter time than by the ordinary method.

Extensive experiments were also made looking towards the low-temperature carbonization of coals with consequent recovery of the by-products and the production of a coke which would be ideal for domestic use. Ordinary coke, such as is on the market to-day, is low in volatile matter and is rather difficult to ignite and to control in stoves and heaters. With low-temperature coke, on the other hand, a considerable proportion of volatile matter is left in the coal, ranging from 12 to 15 per cent, making a coke easy to ignite and control in the ordinary furnace. One of the advantages of this system would be the large amount of valuable by-products which would be obtained from the coal and which are now wasted when the coal is burned. This country burns 500,000,000 tons of bituminous coal yearly, and at a conservative estimate an equivalent of 100,000,000 tons of this is wasted in gases and volatile matter containing kerosene and gasoline phenols and valuable organic compounds which can be manufactured into medicines and other useful products. While the low-temperature carbonization of coals is not yet on a commercial basis, there is no doubt that in the near future some system will be worked out for the conservation of the products which are now wasted in our furnace processes.

Air-Planes in Air-Sampling

An interesting phase of the investigation in connection with the atmospheric survey was the use for the first time of airplanes for obtaining samples of air at various levels over the city for analysis. In this connection it was desired to determine what effect, if any, the presence of smelters located in the valley would have on the smoke situation. For this purpose careful chemical analysis was made of the atmosphere throughout the city for the determination of sulphur dioxide gases. These samples were taken at 3,600 feet, 2,200 feet and 1,000 feet above the city as well as on the roofs of buildings and at the street level. Sulphur dioxide down to one-tenth part per million was detected by the methods used. It was found that the sulphur in the atmosphere was no more in



APPEARANCE OF A FILTER USED IN MAKING ANALYSES OF CONTENTS OF THE ATMOSPHERE
The material collected is subjected to chemical and microscopical examination

extent than would be expected from the sulphur content of the coal burned in the city, as shown by chemical analysis, and had no effect upon the smoke situation.

Plans for the Future

As a result of the investigation, which extended from the first of September, 1919, to the first of May, 1920, complete recommendations have been made in which a program of attack was laid out for the reduction of all classes of smoke to a minimum. These recommendations embody a smoke ordinance written especially to cover the local situation and an outline of the organization necessary to accomplish the desired results. The plan includes engineering supervision of new furnace equipment as installed; reconstruction of existing furnaces where required; systematic smoke observation and personal instructions to engineers and firemen, as well as a campaign of education among householders in the proper firing of their stoves and furnaces.

It may be said in general that it is possible to burn coal smokelessly in all classes of equipment. From a theoretical standpoint the engineering features have all been worked out. If this were all there is to the problem, it would be an easy matter to abate smoke in any of the soft-coal-burning cities. There is another side, however, to the problem, and that is the psychological side. Cities get just about as much smoke abatement as the public demands, and no more. It requires an aroused public sentiment before much progress can be made. Thus it becomes a question of educating the public in the possibilities of smoke abatement. Once it becomes firmly fixed in the public mind that smoke can be eliminated and a large saving made in fuel at the same time, it will be easy for engineers to work out a solution.

The matter is fundamentally a conservation problem, and it is encouraging to find that government bureaus interested in fuel conservation are empowered to lend aid in such important work.

Financing Preliminary Road Work

Automobile Club and Business Men Underwrite Preliminary Expenses of County Engineer's Office

By S. W. Snively
Managing Editor, Terre Haute Star

UNDER the state laws of Indiana the auditor of a county cannot pay for the preliminary work of the county engineer until the bonds for the road have been sold, as the engineer's pay and that of his men must come out of the proceeds of the bonds. In case of delay in selling the bonds the engineer has had to pay all the expenses out of his own pocket, including the salaries of his assistants, and this he can rightfully refuse to continue to do.

As there were a large number of roads in Vigo County on which estimates were being made, the Terre Haute Automobile Club, through its Board of Governors and President, located a patriotic bank and made arrangements to enable the work to be properly financed and completed. The plan was developed through a conference between the County Engineer and officers of the Automobile Club, and the arrangement has been thoroughly endorsed by business men who have been consulted.

Provision is made for financing the work of the County Engineer and his force by a note negotiated through the Citizens' Trust Company of Terre Haute, thus supplying immediate funds for the survey and for the drafting of plans and specifications for the improvement. The bank is handling the undertaking at a low rate of interest in order to assist in pushing forward work which it realizes is for the benefit of the whole community. It is arranged that the County Engineer take up the note as soon as bonds for the road improvement are sold.

So far as is known, this is the first county that has assumed the public underwriting of road building. It is probable that other counties that have been tied through lack of funds for preliminary work will adopt the same system to insure road improvements.

Board of Arbitrators Sets Purchase Price of Public Utility

By Farley Gannett
Consulting Engineer, Harrisburg, Pa.

AFTER eleven years of struggle between the Schuylkill Haven Gas & Water Company and the borough of Schuylkill Haven, a board of three engineer arbitrators has set the purchase price of the utility company's property, and both sides have agreed thereto. During these years of conflict the courts, the Attorney-General of Pennsylvania and the Public Service Commission of Pennsylvania have all been resorted to, until finally, through the instrumentality of the Commission, a valuation by a board of engineer arbitrators was agreed to, and with one of the engineers of the Commission as chairman, this board made an inventory, investigated the books and accounts, and set the purchase price, which has been accepted by the company and by the Borough Council. The Public Service Commission has still to act on this report and appraisal, but has expressed its willingness to accept it if both sides do so. Thus is ended the eleven-year period of litigation and strife between this utility and the borough which it serves, and another instance is given of the promptness and satisfaction which result from this method of establishing the purchase price of a utility.

As far back as 1909 the borough instituted proceedings before the Attorney-General of the state against the water company to annul its charter, because the company was not supplying a sufficient quantity of water. The case was opened in the Court of Common Pleas in 1910, but before a decision was reached, a compromise was entered into by the two parties, by which the company agreed to get an additional supply of water. This it proceeded to do, but the supply which was obtained proved to be inadequate, and in the meantime, as a Public Service Commission had been established in Pennsylvania under the Act of 1913, the borough entered its complaint before that Commission, and in 1915 the Public Service Commission handed down an order requiring the company to secure an additional water-supply and to build certain pipe lines and other works to improve the service.

The company did not comply with this order, and the Commission later placed a fine upon the company and had numerous hearings to determine why the company had not complied with its order, until finally the agreement for the appointment of an appraisal board to determine the price at which the borough was to purchase the plant was reached in the summer of 1919. The report of the appraisers was handed down in the early part of 1920, setting the price at $175,000, which covered a combined gravity and pumping water-supply, and a gas plant and distributing systems.

As a rule, where difficulties of this sort between utilities and the communities supplied take place and continue, as this one has, over many years, it is found that there is usually some basic cause for the trouble, and this case is not an exception. This little company whose value has been set at $175,000 has against it $200,000 of 5 per cent bonds and $300,000 of stock, which statement is enough to show the reason why the company was not able to give the service and raise the funds therefor that it should; in other words, somebody in the past was too optimistic in placing bonds on this property, and when it came to raising additional funds for improvements and necessary repairs and extensions, the credit of the company was not sufficient to enable it to obtain the required funds, and these improvements and extensions were postponed from year to year, hoping that earnings might improve. It was therefore the burden of this large bond issue and the necessity of paying interest on it that made it impossible to give the service required.

A description of the water and gas plants is not essential to this article, but a brief description brings out to a certain extent the attempts which were made to relieve the situation, although on account of the limited funds these attempts were always in-

sufficient to help materially.

History of the Plants

Originally the town was supplied by water from Panther Creek, a small stream about three miles distant, which gave in the early days an ample supply by gravity. Later, when the summer flow became too small to supply the needs of the town, wells were drilled near this dam and pumped by compressed air. Still later, when the courts ordered additional water to be obtained, a pumping station was built on Panther Creek nearer the town, but the Health Department refused to allow this water to be used unless it was purified, and this pumping station was therefore abandoned. Still later a pipe line was run from the Panther Creek reservoir about two miles to Hummel's Run, and through this a small stream was deflected and carried to the Panther Creek reservoir. This proved insufficient almost immediately, and a little pumping station was put on Hummel's Run to pick up the water which collected below the intake for the pipe line above mentioned, and to pump it back to the intake, from which it was transported to the Panther Creek reservoir. This, however, has also proved insufficient; and as the company cannot raise additional funds for further work, except of a most minor character, the only thing left was for the borough to take over the property and use its credit to properly improve the water-supply.

The laws of Pennsylvania provide two ways by which boroughs can take over water-works properties from companies: (1) under the Act of 1874, which provided that the boroughs shall pay the costs of works plus the cost of maintenance, plus the cost of extensions, plus 10 per cent for dividends on the above, less the amount of dividends which have been paid; and (2) under the Act of 1907, and as later amended in 1913, by the appointment of three arbitrators who are to set the value of property subject to review by the courts.

Since 1913, however, the Public Service Commission of Pennsylvania has had to pass upon all such purchases, so that it is customary to start these proceedings under the jurisdiction of the Commission, which takes the testimony and sets the purchase price. In order to obviate the necessity of presenting evidence as to cost and value, and to cut down the time and expense necessary by this procedure, it was agreed by the two parties at interest that each should select an engineer, and that the Commission should select an engineer, and that these three should set the purchase price of the property, subject to the approval of the Commission.

The water company selected as its engineer C. A. S. Sinclair, of Washington, D. C., the borough selected the writer, and the Commission selected its Assistant Chief Engineer, H. E. Ehlers. This board made a detailed inventory of the property, and made two cost estimates, one by reproduction cost using average prices as of the five-year period 1913-1917 inclusive, and the other an historic cost based on the same inventory, using prices as of the time when each piece of work was constructed.

The books of the company were examined in order to determine whether it was possible to make a book cost, but on account of their incompleteness this was found impossible, as there were no books covering the first twenty or twenty-five years. The income and expense accounts were carefully studied, and a statement of the value of the property, based on net earnings, was made up. These were all set forth in the report which was submitted to the parties at interest, and to the Public Service Commission, as it was on the basis of these indications of value that the board reached its determination as to the selling price. The board also accompanied this report with a detailed inventory of the property, in order that the purchasers might check this up at the time the transfer was made and have a complete record of the property with which to open its books.

Reproduction Cost—Five-Year Average

The reproduction cost on the basis of the five-year average prices, 1913-1917 inclusive, for the water department was found to be $156,398, and the accrued depreciation by the 4 per cent sinking fund method amounted to $21,693, or 15.6 per cent, leaving the cost, less depreciation, $134,705. The reproduction cost, on the same basis, of the gas department was found to be $56,009, the accrued depreciation $15,958, and the remaining cost, less depreciation, $40,051. The depreciation was computed largely on the sinking fund basis above

mentioned, but on many items actual observed depreciation was employed, and the actual market price of certain unused equipment was used as a depreciated value.

Historic Cost

The historic cost was built up on the same inventory as the reproduction cost, and where possible, especially with respect to the more recent items, the actual cost as shown by the books was used. The earlier items of property, however, were estimated on the basis of prevailing prices at the time the work was done. The historic cost of the water department was determined to be $134,821, the depreciated cost $116,295. The historic cost of the gas department was found to be $45,027, and the depreciated cost $32,350. The total of the gas and water departments on the historic cost basis depreciated is $148,645. The above facts are summarized in Table No. 1.

TABLE NO. 1

Five-Year Average	Cost New	Accrued Depreciation	Cost Less Depreciation
Reproduction Estimate—			
Water Department	$156,398.00	$21,693.00	$134,705.00
Gas Department	56,009.00	15,958.00	40,051.00
Total	$212,407.00	$37,651.00	$174,756.00
Original Cost Estimate—			
Water Department	$134,821.00	$18,526.00	$116,295.00
Gas Department	45,027.00	12,677.00	32,350.00
Total	$179,848.00	$31,203.00	$148,645.00

Value of Property Based on the Earning Power

A third indication of value was determined upon the average net earnings of the company over a period of ten years from 1909 to 1918 inclusive, as shown in Table No. 2, which shows that the net income averaged over that period was $10,088, having reached a maximum in 1916 of nearly $12,000 and a minimum in 1918 of $7,255.

TABLE NO. 2

Year	Total Gross Revenue	Operating Expenses	Net Income (No Depreciation or Interest Deducted)
1909	$20,964.15	$11,637.82	$ 9,326.33
1910	20,481.23	12,482.83	7,998.40
1911	21,545.64	8,820.43	12,725.21
1912	18,513.86	8,916.55	9,597.31
1913	18,722.23	8,143.63	10,578.60
1914	19,152.87	9,076.27	10,076.60
1915	18,922.63	7,580.30	11,342.33
1916	20,728.58	8,846.55	11,882.03
1917	21,088.92	10,987.69	10,101.23
1918	20,467.08	13,311.54	7,255.54
Average	$20,058.72	$9,970.36	$10,088.36

Neither the reproduction nor the historic costs above determined include items for going value or for water rights, except such amounts as had been actually expended for water rights and damages. In other words, there had been no allowance made up to this point for the fact that the property was a going concern with established business and revenues coming in, or for the fact that the company had ownership and rights upon streams of water, which, although not ample for the supply of the town, were nevertheless useful and to a certain extent valuable in that service, probably to a greater extent than the small amounts of money paid for these rights.

Purchase Price

The board then had before it these facts: that, exclusive of going value and water rights, the reproduction, less depreciation, was $174,756, that the historic cost, less depreciation, was $148,645, and that the property under average conditions could earn about $10,000 per year over and above operating expenses at the prevailing rates. From these premises the board determined that a fair price for the borough to pay and a fair amount for the company to receive would be $175,000.

It still remains for the borough to vote on the issue of bonds and for the Public Service Commission to approve the findings of the board of arbitrators.

Looking at this decision from the standpoint of the company, it will appear that there will be no equity for the stockholders, and the bondholders will have to accept a discount on their 5 per cent bonds, but they are getting rid of a property on which they would have to raise additional funds, with not much likelihood of greatly increased earnings, and a property which has caused them endless trouble and little profit. From the standpoint of the borough it is purchasing a property at practically pre-war prices,

which, however, has to have considerable money spent on it at present prices to put it in shape to afford the service which is required. The borough is paying for this property in 5 per cent bonds on the water plant, and is being relieved of further litigation, which has not only been costly but has also been most disturbing to the citizens and officials.

The total cost of the appraisal and report of the board of arbitrators, which was divided equally between the company and the borough, amounted to less than 2 per cent of the value of the property.

A Contrast in Roads

Improved Surfaces are Necessary to Withstand Modern Traffic

THE EFFECTS OF HEAVY MOTOR TRUCK TRAFFIC ON UNIMPROVED HIGHWAYS

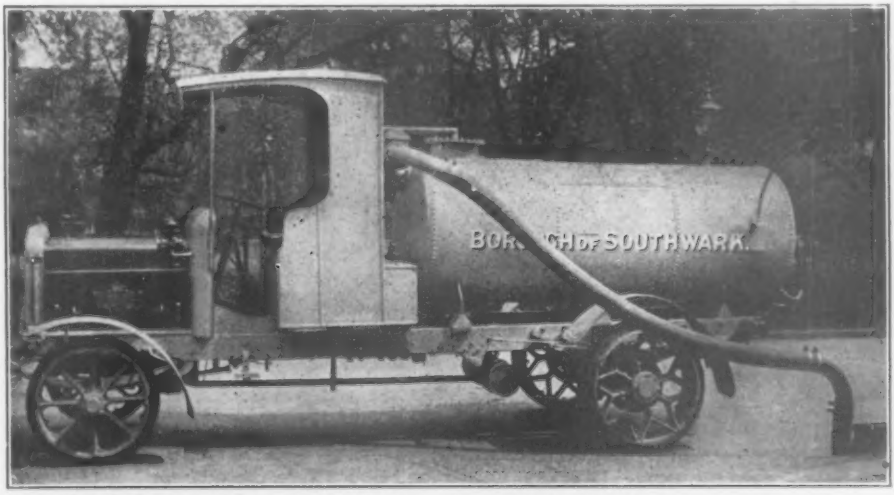
IMPROVING THE LAUREL-DELMAR ROAD, DELAWARE, WITH CONCRETE PAVING

The Labor- and Money-Saving Devices of a London Borough

By Hon. G. A. Isaacs
Mayor, Southwark, London, England

THE Metropolitan Borough of Southwark covers an area of 1,165 acres in one of the most densely populated parts of London. The Borough Council has always shown a desire to be in the van of municipal progress, and has been ready to make use of up-to-date appliances for the efficient operation of the Works Department. In many respects Southwark has been a pioneer in municipal enterprise, and the following description of some of the borough machines may be of interest.

The Borough Engineer, Arthur Harrison, M. Inst. C. C., has been greatly interested in the design and construction of these labor-saving machines. In view of the fact that the machines were purchased either before or during the war, prices have been intentionally omitted, as they would prove misleading and be of little value at the present time.



THE TYPE OF 40-H. P., 5-TON CATCH-BASIN EMPTYING MACHINE USED BY THE METROPOLITAN BOROUGH OF SOUTHWARK, LONDON, ENGLAND

Plant for Crushing House Refuse

For many a year one of the problems exercising the minds of responsible officials has been the satisfactory disposal of house and trade refuse from the great cities. In crowded centers, and particularly in the Metropolis, the question has always been a most pressing one as to the best method to adopt for clearing refuse away quickly and out of sight.

Certain London boroughs own or rent riverside wharves, and the daily collection is shot into barges which are towed down to the mouth of the river. Other authorities send their refuse away by rail to a dump about 20 miles out in the country. Others have erected destructor plants at considerable cost for the purpose of burning the refuse, but this method, even though reducing its bulk, leaves a clinker residue not easy to dispose of in London.

Southwark led the way in the adoption of an entirely new method, viz., that of pulverizing the refuse into a material resembling mold, which obtained a ready sale to farmers for use on the land. The plant consists of four rotary crushers, manufactured by the Patent Lightning Crusher Company, Ltd., each crusher being driven by a 40-B.h.p. motor running at 650 revo-

lutions per minute, geared so as to produce 1,200 revolutions on each crusher. Two of the machines were erected in 1906 and two in 1908, and although they are situated in a closely populated district, there is no nuisance from smell, dust or noise.

The loads of refuse brought to the depot are shot in front of the machines, and in the process of feeding the crushers the men throw out tins, iron, large rags, mats, oilcloth, baskets, boots and bottles. The metals and other saleable materials are sold, and the waste is burnt in a furnace. The refuse passing through the crusher falls onto conveyors discharging into railway trucks, and so on to its destination. Chemical analyses show that the material is a good fertilizer, and is a very suitable dressing for the land, especially on stiff and clay soils.

During the year ended March 31, 1920, no less than 16,491 tons passed through the machines, and this was all sold. Additional plant is now being laid down to deal with the remainder of the refuse collected, as no difficulty is likely to be experienced in effecting a ready sale.

Wood Paving Block Renovating Machine

In 1910 a local firm of engineers—J. Phillips & Company—erected a machine, the first of its kind, for the Southwark Council to facilitate the re-use of wood paving blocks which in the course of years had become worn and uneven on the surface.

By this process the slow and costly hand methods hitherto employed for cleaning and trimming the old blocks are practically dispensed with. Under the old system of handling, a large percentage of the used blocks were either destroyed or discarded as useless. There is little waste by using this process; the blocks, after serving their first term of years, are taken up, cleaned, trimmed and sawed to the required thickness at a fraction of the cost of new ones, and relaid for a further long period of service.

Before they are ready for the saw it is necessary in the case of cement grouted blocks to remove the hard coating adhering to the sides, extract nails and pieces of metal embedded in the wood, and to remove the burred edges. This is done rapidly, effectively and cheaply by an ingenious arrangement of steel pins revolving at a high speed. Pitch grouted blocks are passed through a tank of hot water, and easily cleaned with a scraper. This having been done, the blocks automatically pass on to the saw and are reduced to the required gauge.

The life of wood paving is therefore extended over an increased number of years at a trifling cost, and both in regard to efficiency and economy this machine does all that is claimed for it. It is not complicated in construction, its details and working parts are readily mastered, and it is easily kept in order.

Motor Catch-Basin Emptying Wagon

That the old method of emptying street catch-basin by manual labor, horses and vans is out of date has been demonstrated by Southwark, which in 1913 secured for this purpose from Straker-Squire, Ltd., a motor wagon worked on the vacuum principle.

The motor is one of 40 h.p. and is mounted on a standard chassis with a cylindrical tank, there being also attached a vacuum pump driven through a clutch by the motor. This pump exhausts the air from the reservoir, creating a vacuum of about 12 pounds below atmospheric pressure. To the tank is fitted a 5-inch sluice valve with sufficient hose of 5-inch section to reach the bottom of any ordinary catch-basin. The pump may be worked while the car is running, and when sufficient vacuum is created—usually a matter of some 10 or 15 minutes—the suction hose is let down into the gully and the sluice valve opened, which immediately causes the sludge to rise in the pipe into the tank.

In practice it is found advisable to first stir up the solids in the bottom of each catch-basin, this being done by one of the men attending the machine. The capacity of the tank is about 4 tons [of 2,240 pounds—*Ed.*], and when it is full a float automatically shuts down a valve, thus preventing the sludge from rising above the safe level in the tank. An indicator is also fitted, from which can be ascertained the level of the sludge as it rises. The emptying of the tank is effected by opening a 12-inch hinged door at the back, normally closed by a screw dog on rubber facing, which makes an effectual air-tight joint.

Experience proves that the cost of running this machine works out at 20 per cent less than the cost of the old method, besides the obvious advantage of having the work done in a more cleanly manner, more expeditiously and with considerably less inconvenience to the public.

Street Washing Motor

The Southwark Council also possesses three 45-h.p. motor street washers, which are doing excellent work, purchased in 1916 and 1917 from Straker-Squire, Ltd.

In this street washer a rectangular tank, having a capacity of 800 gallons, is mounted upon a standard chassis. Two distributing pipes run from this tank to the front of the motor, and a centrifugal pump, worked from the engine, forces the water through the pipes at a high pressure, thus effectively washing the surface of the paving. Underneath the tank is attached a set of three 30-inch lengths of rubber on the squeegee principle, which further assists the work, and this is raised or lowered by a lever as desired.

The machine is alternately used during dry weather for watering gutters only, when no pressure is required, the water being simply carried through a third pipe directly below the tank, distributing it about a foot or so from the curb.

One result of the use of this type of machine, taken in conjunction with the fact that many macadam roads have in recent years been converted to wood block, asphalt or concrete, is that the amount of refuse collected has fallen very considerably. Admittedly the consumption of water has increased, but from the public health standpoint any effort towards cleaner streets is a step in the right direction.

Sand and Ballast Washing Machine

Southwark claims to be among the first in the Metropolis in setting out upon a large scheme of post-war road improvement works, and so absorbing a big percentage of local men of the laboring class demobilized from the British Expeditionary Forces. In this connection it is worthy of mention that some 250 ex-service men have found employment in this way, and to this day the Council has succeeded in providing continuous work for the majority of these men.

The importance of securing sufficient material for such extensive works is obvious, but very soon it was found that ballast did not arrive fast enough to keep the work going; hence the necessity for finding some satisfactory substitute.

In the past the crust of macadam roads had been regarded as only fit to discard at the dump, to which it was conveyed by rail some 20 miles out of London. Why not salvage the best of this excavation and convert a waste material into something useable for concrete foundations? A portable machine, adapted to meet the requirements, was accordingly obtained from W. H. Baxter, Ltd., of Leeds, and soon demonstrated its usefulness.

The construction of the machine is fairly simple. A cylinder measuring 16 feet long by 3 feet diameter is mounted on wheels at an angle of 15°, to the interior of which a spiral T iron is fixed. Power to drive this cylinder is supplied by a small petrol engine fitted to the same undercarriage. The cylinder revolves at a steady rate, while a length of 1½-inch hose connected from the nearest street hydrant to the upper end of the cylinder provides a constant flow of water. The excavation is fed into the lower end of the machine, and the rotary motion of the cylinder tumbles the material and conveys it through until it is deposited at the top end washed clean and ready for concrete making. Simultaneously a series of varying screens separates the material into three gauges, all of which in turn are used with distinctly satisfactory results. The residue—a low percentage—is used for mortar making.

The machine is moved from one job to another as occasion demands. Cartage of excavation to depot and railway charges are saved, likewise the purchase of ballast and cartage to job.

The machine has more than justified its selection, so much so that another was placed on order some months ago and is daily expected to arrive, when it will immediately be put to use.

Maintenance of Stone and Gravel Roads

By Wm. Watters

Road Superintendent of Lanark County, Ontario, Canada

AS the ever-increasing motor traffic makes it imperative that road engineers be prepared to meet constantly changing conditions, the writer believes it is well to have one foreman or overseer to look after from four to five miles of roads at all times, and in addition to this, a "traveling patrol" consisting of two men and teams furnished with the necessary tools, such as grader and plow and wagon, to work in conjunction with the local foremen. Wherever there is ample stone and gravel for these men to work with, good results are obtained. Considerable money has been spent on maintenance, and it is believed that the Department was well advised when it decided to make the grant for maintenance equal to that for construction. Since 1900, we have spent on maintenance the sum of $112,210.95, of which $35,459.21 was spent in 1919—more than double the amount spent in 1918.

To keep the roads in prime condition, the graders should be put into service just as soon as the frost has gone out enough in the spring. Turn the shoulders out first, then reverse, and if possible bring enough material in to the crown so that the water cannot lie in it, and under such conditions the road will stay fairly good most of the season. The writer believes that the ordinary water-bound macadam or gravel road will not stand up without some surface treatment such as Tarvia or asphalt.

With regard to the maintenance of the leading or provincial county roads, it is felt that methods of construction will have to be changed so that maintenance can be much longer deferred than at present. The motto "Build your maintenance into your construction" is a good one. In this way, by starting with good drainage, with a proper grade and well-built foundations, and finishing the road with some reliable bituminous binder by the penetration method, expensive maintenance will be largely overcome. Lanark County is going to start building along these lines with every confidence of success, and will patrol the roads just as soon as enough broken stone and gravel can be secured and laid down in stock piles with a medium-sized truck, so that maintenance throughout the county can be expected.

How the National Menace of Underpaid Teachers Is Being Faced

THE national menace which has appeared as a result of changing economic conditions, in the form of a shortage of teachers in the public schools, is actually more dangerous than adult illiteracy or the un-Americanized foreign-born element, however serious and threatening these problems may be. The shortage of teachers has already added more than half a million to the army of children who are without any school advantages whatever, and unless its influence is checked it will in a few years result in a crop of illiterates many times greater than was revealed by the war in 1918.

But this condition will be corrected. The public in some of the more progressive communities has already responded to the need of doubling the pay of teachers. For every one of these communities, however, there are scores of places where the public has not yet awakened to the seriousness of the situation, and these are the places which must be reached with adequate information as rapidly as possible.

It should be considered the duty of every teacher and every citizen interested in the welfare of the schools to assist in placing before the public the dangers which actually threaten the efficiency of the public schools. It is also suggested that teachers and citizens ask the local press to make use of the information given in the table on page 25, so as to get before the people what has actually been done in some places to increase the salaries of teachers.

		Elementary Teachers		High School Teachers	
		1919	1920	1919	1920
Adams	Minimum	650	850	850	1000
Mass.	Maximum	800	1200	1000	1400
Adrian	Minimum	650	950	800	1150
Michigan	Maximum	800	1100	1800	2050
Beaumont	Minimum	540	750	720	950
Texas	Maximum	945	1050	1350	1900
Bellingham	Minimum	650	840	960	1140
Wash.	Maximum	1020	1260	1440	1680
Berkeley	Minimum	900	1200	1380	1680
Calif.	Maximum	1320	1620	1620	1920
Berlin	Minimum	600	900	650	1000
N. Hamp.	Maximum	1000	1300	1600	2050
Bluefield	Minimum	675	765	810	855
W. Va.	Maximum	765	810	1100	1200
Cen'l Falls	Minimum	580	900	980	1380
R. I.	Maximum	800	1300	1100	1540
Cleveland	Minimum	700	1030	100	1300
Ohio	Maximum	1400	1725	2500	2760
Coffeyville	Minimum	698	720	900	990
Kansas	Maximum	810	810	1035	1494
Columbus	Minimum	750	1000	900	1125
Ohio	Maximum	1200	1600	1800	2250
Cumb'rl'd	Minimum	600	600	750	750
Md.	Maximum	850	850	1000	1000
DesMoines	Minimum	750	1180	950	1250
Iowa	Maximum	1200	1505	1550	1940
Dubuque	Minimum	600	800	850	1000
Iowa	Maximum	900	1200	1250	1550
E. Aurora	Minimum	550	750	950	1150
Illinois	Maximum	1050	1250	1800	2000
E. St.Louis	Minimum	550	800	750	1000
Illinois	Maximum	1100	1550	1900	2450
Eau Claire	Minimum	495	765	765	990
Wisconsin	Maximum	675	810	1440	1600
El Paso	Minimum	540	900	900	1100
Texas	Maximum	1000	1200	1600	1800
Evansville	Minimum	600	700	900	1000
Indiana	Maximum	950	1100	1650	1800
Fargo	Minimum	675	945	990	1170
N. Dak.	Maximum	810	1080	1080	1530
Fitchburg	Minimum	600	1050	750	1200
Mass.	Maximum	900	1650	1100	2450
Hamilton	Minimum	475	700	800	1200
Ohio	Maximum	950	1500	1800	2100
Hatt'sburg	Minimum	540	630	720	900
Miss.	Maximum	870	1000	1350	1500
Henderson	Minimum	468	468	800	800
Kentucky	Maximum	716	716	1250	1350
Holland	Minimum	650	1000	675	1000
Michigan	Maximum	775	1000	1200	1400
Joplin	Minimum	450	540	765	855
Missouri	Maximum	653	810	1170	1350
Kans. City	Minimum	750	925	1000	1200
Missouri	Maximum	1250	1350	2050	2350
Lansing	Minimum	600	800	800	1000
Michigan	Maximum	850	1050	1700	1950
Lawrence	Minimum	675	900	900	1000
Kansas	Maximum	1200	1400	1250	1500
Lincoln	Minimum	750	1000	900	1000
Nebraska	Maximum	1250	2200	1550	2200
Madison	Minimum	750	950	1050	1200
Wisconsin	Maximum	900	1100	2100	2100
Midlet'wn	Minimum	600	1080	650	1135
Conn.	Maximum	975	1330	1400	1740

		Elementary Teachers		High School Teachers	
		1919	1920	1919	1920
Monessen	Minimum	585	738	945	1080
Pa.	Maximum	972	1170	1530	1764
Montclair	Minimum	900	1050	1150	1500
N. J.	Maximum	1125	1550	2500	2900
Muskogee	Minimum	540	810	810	900
Okla.	Maximum	855	1080	1080	1350
Nashua	Minimum	650	900	900	1200
N. H.	Maximum	900	1200	1100	1400
Newark	Minimum	700	900	1000	1000
N. J.	Maximum	1200	1500	2700	2800
New B'df'd	Minimum	750	1000	1000	1200
Mass.	Maximum	1000	1350	1900	2375
Newport News					
Virginia	Minimum	576	1100	697	1400
	Maximum	616	1600	819	2000
Okla. City	Minimum	760	760	1200	1200
Okla.	Maximum	1140	1140	1800	1800
Paducah	Minimum	450	540	675	855
Kentucky	Maximum	585	720	1125	1350
Park'sburg	Minimum	562	675	800	900
W. Va.	Maximum	875	945	1500	1700
Paterson	Minimum	830	1040	1200	1440
N. J.	Maximum	1400	1640	2500	2740
Petersburg	Minimum	600	700	750	850
Virginia	Maximum	900	1050	1800	1950
Plattsburg	Minimum	450	750	800	950
New York	Maximum	600	1150	900	1350
Pottstown	Minimum	470	720	800	1050
Pa.	Maximum	640	800	1500	1800
Saginaw,E.	Minimum	600	925	875	1150
Michigan	Maximum	975	1250	1650	1950
San Jose	Minimum	900	1200	1300	1600
Calif.	Maximum	1260	1560	1600	1900
Sharon	Minimum	495	855	810	1215
Pa.	Maximum	810	1238	1500	1950
South Bend	Minimum	550	800	850	1050
Indiana	Maximum	1150	1400	1800	2000
Sp'tanburg	Minimum	540	720	675	900
S. C.	Maximum	675	1080	1000	1200
Spokane	Minimum	750	850	1100	1150
Wash	Maximum	1150	1350	1600	1750
Springfield	Minimum	500	800	900	1200
Illinois	Maximum	950	1200	1500	1800
Springfield	Minimum	880	1180	1150	1150
Mass.	Maximum	1050	1350	2800	3100
Stillwater	Minimum	540	720	765	855
Minn.	Maximum	630	783	1098	1530
St. Paul	Minimum	600	600	800	1500
Minn.	Maximum	1000	1500	1600	2100
Tucson	Minimum	810	1080	1150	1300
Arizona	Maximum	990	1080	1650	2000
Utica	Minimum	550	800	800	1000
N. Y.	Maximum	1000	1400	1200	1600
Waycross	Minimum	540	540	810	900
Georgia	Maximum	720	720	1200	1200
White Pl'ns	Minimum	850	1000	1200	1500
N. Y.	Maximum	1125	2000	2200	2800
Wilk's Barre	Minimum	552	702	660	825
Pa.	Maximum	960	1200	1800	2070
Wil'mantic	Minimum	850	1100	930	1150
Conn.	Maximum	1000	1150	1100	2100

America's Housing Need and How to Meet It

By R. P. Blake
Supervising Engineer, Independence Bureau, Philadelphia

THE housing shortage in America at the present time is so great as to be a national problem of first importance. Such surveys as have been made indicate that before all our people could be properly housed, accommodations for at least one million families would have to be provided.

Confronted with the existing very large and growing housing deficit, handicapped by lack of funds, by shortage of labor, by uncertain and mounting costs, and the necessity of educating the public to accept new cost levels, the ordinary building agencies are utterly unable to meet the need within any reasonable period of time. Conditions appear certain to get worse before they get better, unless vigorous, well-planned community effort on a nation-wide scale is added to the activities of the ordinary building agencies. Otherwise relief is a matter of the indefinitely distant future.

In this discussion we are seeking to answer the question, "What can we do to get houses and get them in a manner which will in the long run prove to be best for the investor, for the purchaser, and for the community at large?"

The Reason for the Shortage

House building started to decline in 1914 and the decline increased as the war progressed, particularly in 1917 on account of our large war program, the shortage of money, the necessity of conserving labor and materials, and the uncertainty of the future. The high cost of building has caused investors to hesitate before placing their money in house-building enterprises. It seems unlikely, however, that building costs can be reduced to any great extent for a number of years. Various factors point to this.

The first of these is the very large housing shortage, which it will certainly take years to meet. Obviously, price reduction cannot be expected as long as demand exceeds supply. Building materials in general can be cheapened only by reduction in labor or transportation costs. Transportation costs seem sure to rise, while labor costs can (short of actual wage reduction) decrease only through increased production per unit of labor. In the face of the world-wide shortage of labor, the high cost of living, and the organization of labor, wage reductions of any magnitude seem out of the question. To increase production per unit of labor either through better methods and equipment or through increasing the efficiency of the worker will obviously take much time. We are therefore forced to the conclusion that we must resolutely and vigorously face the task of meeting our serious housing shortage at present building costs.

Housing a Good Investment

It can readily be shown that house building to-day under correct conditions is a good investment because costs relatively are not abnormally high when compared with incomes and with the purchasing power of the average substantial community. In the large, practically handled, housing development economies of from 10 to 20 per cent can be obtained through quantity purchase, quantity building, organized management, and the most efficient use of labor and materials when compared with the operation of the ordinary builder of moderate capacity. This saving will operate as a safeguard against loss, should building costs be lowered.

But there is danger of serious loss in poorly planned housing. Anyone who has thoughtfully observed the haphazard house building in American cities, whether by the ordinary real estate builder or by industrial corporations, cannot escape the conviction that very great losses have frequently been sustained by the builder or the community or both, through failure to base the operation upon sound and accurate information, to observe proper standards, and to follow the right sort of policies. As instances may be cited the monotonous and frequently squalid housing in the ordinary steel town; the flimsy, box-like shacks of the wildcat builders, and the dark, unlighted, undrained

tenements of some of our large cities.

The entering by the community into the business of building houses is a very important step and one which requires careful consideration before decision is made.

The building and sale or rental of houses is one of our oldest and best-established industries. Its maintenance in a sound condition, so that the housing needs of a community will be best met in a reasonable fashion, is of paramount importance. Therefore it is vital that legitimate interests engaged in building houses should be fostered rather than retarded. Since hope of a reasonable return on the investment is what attracts money in any broad activity, it should be evident that under normal conditions housing cannot successfully be put on any other basis than one assuring a reasonable return. On the other hand, it is so very important that a community be adequately housed, that a considerable degree of control over housing must be exercised by the community if serious abuses are to be prevented and its best interests safeguarded.

Any community which does not retain control over the character of its housing is bound to suffer from the varying standards applied by those normally engaged in building. The community upbuilt through the uncoördinated efforts of a large number of builders will be subject to the evils growing out of bad housing. Almost any American city might serve as an illustration of this fact. Striking instances such as Akron, Ohio, and Pittsburgh, Pa., are so well known as to require little comment.

Lack of community supervision often results in greatly inflated values, which work much hardship on the average home buyer. It has been estimated that in Gary, Ind., home buyers lost approximately $10,000,000 from inflation of values in a single decade. A community housing project at Akron, Ohio, finds itself seriously handicapped by the inflation of real estate prices resulting from unchecked land speculation. In the end, the home buyer or home renter of moderate income pays for this inflation.

When the ordinary building agencies cannot meet the housing needs, it is clear that if housing is to be secured it is necessary for the community to find out what is needed and take steps to see that that need is met. This may involve the formation of a community housing development to provide whatever housing the builders cannot supply, or it may mean merely assisting legitimate builders.

Need of Adequate Information and a Definite Program

The factors affecting housing conditions and the remedies necessary are many and varied. Many of the factors are new. If the maximum results are to be had and serious mistakes avoided, action must be based on a thoroughgoing study of conditions, both local and general, and a definite program should be drawn up, with demonstrably sound policies clearly set forth and understood.

The survey as a basis for drawing up a practical program comes first. It will usually cost less than half as much as the cheapest house recommended as a result. The cost of this preliminary work is usually borne by the Chamber of Commerce or other representative body. With the report at hand, the money is generally best raised through a combination of private and semi-public solicitation of the interests suffering from the housing shortage, together with, in some cases, public stock subscriptions through an intensive campaign. The analysis and report must, therefore, be both educative as to the need, and clear and convincing as to the soundness of the investment. Obviously, this means organized sales and publicity effort.

It all comes down to a matter of interesting money hitherto unfamiliar with housing. Anyone with experience in the promotion of new enterprises knows that given a sound project, definite facts, and a demonstrably practical plan promising reasonable returns with small risk, money can be raised. Uninformed enthusiasm or impractical philanthropy will not suffice and are likely to do damage.

Organization of Housing Company

It is best to form an incorporated company with board of directors, executive committee and salaried staff. The staff will vary in size and cost with the scope of the program undertaken. This will involve a considerable overhead charge, but the overhead necessary to insure efficient management will prove to be true economy. Such costs will vary, but an overhead ex-

pense for management, supervision, and sales of from 5 to 10 per cent of total construction cost is usually necessary. Architects' services will add from 4 to 6 per cent, but will include supervision of construction and much other service for the higher figure. While these overhead costs may seem high, they will be included in housing obtained through any agency, though they may not be recognized as overhead. All construction should be contracted for, as organizing a construction company for a community housing project would be highly questionable under any circumstances, and usually not to be considered.

Terms of payment should be definitely determined only after finding out what costs will be and what terms the purchasers can best meet. This will be shown from the survey. The purchasing power of the average substantial community, however, is very great, as is being proved in many communities, notably Mansfield and Akron, Ohio, Cumberland and Baltimore, Md., and Philadelphia, Pa. Families must be classified according to income, size and standard of living. The experienced person will then be able to tell very closely how many houses of each type and cost can be sold or rented and on what terms of payment.

Standards of Construction, Design and Appearance

All community housing projects must aim primarily at one thing—providing good houses for sale or for rent on terms which the future owners or tenants can meet without undue hardship. This means that not only must the house be structurally good, so that it will have life, but it must also be practically planned, pleasing in design and appearance, and the surroundings must be good.

Large classes of people who formerly sought little more in a house than shelter and low rent are now demanding and are able to pay a reasonable price for fully modern, well-designed houses. The experience of the last few years indicates that even in very moderate-priced housing anywhere from 25 to 50 per cent of the value depends upon questions of comfort and appearance, and this percentage increases with the standard of living. If standards of design and appearance are too low, the house is likely to be unsalable or unrentable except under pressure of a severe housing shortage.

It is the part of wisdom, therefore, to determine what standards will prove best in the long run and then secure them as economically as possible—but without fail secure them. If they are to be sold the payment terms must then be adjusted to the ability of the purchasers to meet them. If this cannot be done, the project is not a sound one as an investment and must be financed on a semi-philanthropic basis or as a public necessity, if at all.

Selling versus Renting

The advantages of home owning both to the individual and to the community are so great, provided good homes at fair prices are obtainable, that wherever possible all efforts should be aimed at sale rather than rental. The home owner has a real stake in the community and will help maintain good standards of community life, while for him home purchase is in the nature of a savings account. Objection has been raised to long-term home-purchase plans on the ground that a man should not spend most of his life paying for a home, but if he pays rent all his life, what has he?

It is undoubtedly a fact that, generally speaking, in the past house rents have not been on a basis yielding a reasonable return on the investment. The investor has looked largely to the appreciation in land values to increase his return. This method is at best a gamble that under present conditions will not attract much capital to the housing field. An analysis of rental and sale charges, as the careful investor will view them, shows approximately:

RENTAL CHARGES ANNUALLY PER $1,000 OF INVESTMENT

Interest at 6 per cent	$60.00
Amortization	18.00
Insurance at $2.00	2.00
Taxes at $2.50 on 80 per cent	20.00
Repairs and maintenance	30.00
	$130.00
Assume 2 weeks' vacancy per year	5.25
	$135.25

This is approximately $11.30 monthly per $1,000, or $56.50 per $5,000 home. Amortization is estimated on a basis of returning 50 per cent of the investment in 20 years. Repair and maintenance costs are estimated above on the basis of a 6-room modern house costing $5,000, including land. For

A GOOD, LOW-PRICED DEVELOPMENT. GREATER VARIATION IN DESIGN ALONG THE LEFT SIDE OF THE STREET WOULD HAVE EFFECTED CONSIDERABLE IMPROVEMENT

A WELL-PLANNED DEVELOPMENT. SUCH CONSTRUCTION AND ARRANGEMENT MAKE FOR LASTING SATISFACTION AND MAINTENANCE OF VALUES

CHEAP CONSTRUCTION AND MONOTONOUS GROUPING IN AN EXCELLENT LOCATION WHICH MIGHT HAVE BEEN DEVELOPED IN AS SATISFACTORY A MANNER AS THE STREET SHOWN NEXT ABOVE

frame construction kept in good repair, these repair costs are low except with very good tenantry, while for brick, stone or good stucco construction lower costs would be the rule for the first ten years.

Sale charges for a similar 6-room house will show:

Assume first mortgage 60 per cent at 6 per cent interest	$3,000
Assume second mortgage 30 per cent at 6 per cent interest	1,500
Cash payment 10 per cent	500
	$5,000
Interest on first mortgage	$180
Interest on second mortgage	90
Payment on second mortgage equal to interest	90
	$360

This means $30 per month to the building or holding company. This will discharge the second mortgage in about 11½ years, and if the same rate of payment were continued it would discharge the first mortgage in a like period. This is the plan widely used in building and loan societies, except that the payments other than interest are used to buy stock in the building and loan company, which, with dividends earned, may shorten the payment period somewhat.

In addition, the home purchaser has the following charges:

Taxes $20 per $1,000	$100.00
Insurance $2.00 per $1,000	10.00
Repairs and maintenance $15 per $1,000	75.00
Total	$185.00
Payments	360.00
Total carrying charges	$545.00
or approximately (monthly)	$45.40

The above repair and maintenance costs are based on the fact that the average home owner of moderate means will do much of this work himself. Obviously, he can neglect amortization. The above comparison forces the conclusion that except under special conditions, as, for instance, where high land values prevent all idea of sale to the individual family, it is better to attempt the construction of housing to be sold rather than to be rented.

Coöperative Community Projects

The garden cities of England, some of which have resulted from truly coöperative community projects with stock ownership in the community company substituted for ownership of the individual house, have attracted much attention, and efforts to introduce the idea in this country have been made. While the plans proposed are extremely promising, it is not through any such departure from existing practice that the necessary amounts of money to relieve the present emergency can be secured. Such coöperative housing may do much in a decade, but the need is upon us and will not wait.

Developments such as those of the Octavia Hill Association, the Girard Estate of Philadelphia, and the Schmidlap project in Cincinnati offer much promise along the lines of rejuvenation of low-grade districts in crowded communities, but they cannot greatly influence at this time the course of new construction, because they do not offer sufficient returns to attract the very large amounts of capital necessary.

The Town Plan

No broad discussion of community housing can well afford to omit reference to the importance of the town plan. Housing and home life, while the major factors in the community, can be dealt with intelligently only if considered in connection with many other things, and therefore any attempt to solve any large housing need as an isolated factor is foredoomed to partial failure.

Town planning is not primarily the special treatment of a group of buildings, the beautifying of a public square, or the creating of some spot of special interest. True enough, these are to be expected in the fulfillment of a well-planned scheme, but they are not basic. Town planning is the careful, thoughtful analysis of all the activities which go to make up a community, and the future caring for these, through a well-defined plan, in such a manner as will allow each to function properly for itself and as a whole. Proper expansion must be controlled and safeguarded through the formation of well-defined zoning and building laws, which must logically form a part of the town plan.

Town planning is a large and important work and of vital interest to our fast-growing cities. That it pays is readily proved by briefly reviewing some of the enormous expenditures of our larger cities, necessitated in street opening, extending and widening, and in our smaller cities, money wasted in relaying work originally not properly conceived; to say nothing, in the cases of both, of the vast amounts lost by reason of property depreciation through uncontrolled and unhealthy expansion.

Forward Steps
Reported to THE AMERICAN CITY by Municipal Officials & Department Heads

Public Welfare Departments

Denver's Free Weighing Scales

DENVER, COLO.—So far as this department knows, Denver is the only city in the United States that has established public free weighing scales as a protection to the consumer against profiteering. The Inspection Department of the City and County of Denver, having been called upon frequently to weigh groceries at its headquarters in the City Hall, decided to establish scales near the down-town central district for greater convenience.

These scales, in charge of an attendant, have been in operation since March 27, 1920, the service, of course, being free of charge. During the first thirty days 2,069 packages were weighed, of which only 87 were found to be short in weight. In most instances the packages were short just a few ounces, but there were some exceptions where a shortage of from one-half to one pound was discovered.

Whenever a short weight is discovered, the purchaser is given a certificate stating the actual weight of the package, the nature of the package and the price. The certificate also contains the name of the merchant who sold the package and the name of the purchaser, with their respective addresses. The purchaser then returns the package to the merchant with the slip and receives adjustment. All complaints

WHERE DENVER TEACHES MERCHANTS TO MEND THEIR WEIGHS

have been quickly and satisfactorily adjusted.

The attendant at the free weighing scales keeps a record of all packages weighed. Whenever a repetition of short weight is found to have occurred in the same store, an investigation is made by the Chief Inspector. The most important result of the innovation has been that it has served to make merchants more careful in weighing packages and to give the public a feeling of confidence that they are getting fair treatment from the merchants. The scales are open from 9 to 12 A. M. and 1 to 6 P. M. every day, and to 9 P. M. on Saturdays Any package weighing from one ounce to one hundred pounds is handled by the department.

A. MEDARIS,
Chief Inspector, Department of Inspection.

Police Departments

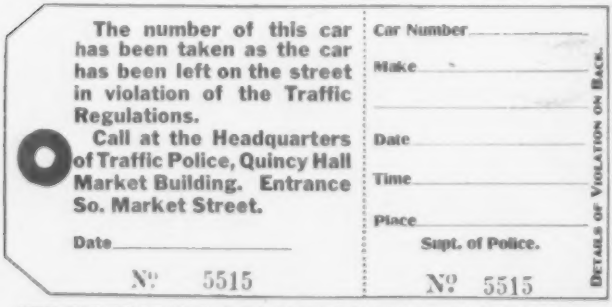
Tagging Traffic Offenders

Boston, Mass.—The traffic regulations of the city of Boston provide that no vehicle shall be left standing in a public street for more than twenty minutes between 6 A. M. and 6 P. M. As this rule was frequently violated, especially by shoppers, and as it was sometimes difficult for the policeman to locate the person actually responsible for this infraction of regulations, the following system has been tried out:

When an officer observes an automobile standing unattended in a street longer than the time allowed, he notes the number of the car and ties a tag upon the machine, directing the owner to call at Traffic Headquarters at a stated time. There the owner is questioned, and it is ascertained whether or not he is a persistent offender or has merely acted in ignorance. The commanding officer may then determine whether the case should be carried into court. The officer retains one-half of the perforated tag on which to make his report.

In down-town districts this plan has been successful in reducing the congestion due to the unauthorized parking of private cars.

EDWIN U. CURTIS,
Police Commissioner.


The number of this car has been taken as the car has been left on the street in violation of the Traffic Regulations.
Call at the Headquarters of Traffic Police, Quincy Hall Market Building. Entrance So. Market Street.
Date
No 5515
Car Number
Make
Date
Time
Place
Supt. of Police.
No 5515
Details of Violation on Back.

THE TAG THAT HELPS TO PREVENT TRAFFIC CONGESTION IN BOSTON

Fire Departments

Libraries in City Fire Stations

Boston, Mass.—Under any circumstances a considerable part of a fireman's time must be spent in enforced leisure. This idleness is tiresome to the fireman himself, as the means of recreation afforded by the average station house are very limited. Boston has decided upon a plan of utilizing this spare time in a way which will interest the firemen and increase the efficiency of the Department.

The city has included in its Fire Department appropriation approximately $2,500 to establish small libraries of standard books in each fire station. The books in question will cover the following subjects of especial interest to the men:

Fire Prevention and Fire Fighting
Automobile Machinery
Gas Engines
Steam Engines
Marine Engines
Building Construction
Electricity and Telegraphy
Hydraulics

JOHN R. MURPHY,
Fire Commissioner.

Fire Hazards Not Allowed

TROY, N. Y.—Since "Clean-up Week"—May 3-8—the city of Troy has felt itself much nearer the ideal of public safety. During the previous week the Chief of the Fire Bureau caused a thorough inspection to be made of all yards, cellars and alleyways by a detail of firemen. After Clean-up Week a reinspection was made to determine what improvement had been made in cleaning and in gathering up and removing rubbish, paper, old boxes, etc. The improvement was found to have greatly exceeded expectations in the matter of the thoroughness with which the work was done.

In the public schools lectures were given on fire prevention and sanitation, and, thus instructed, the children aided materially in making the week a success. The merchants throughout the city displayed great interest in the undertaking, and devoted much space to advertising and displaying brooms, shovels, etc. The bus lines carried stream-

CITY OF TROY

Bureau of Fire—Department of Public Safety

Inspection Report on Hazardous Building Contents

Location of property.....

Owner of building.....

Occupant of building—1st.....

2nd.....

.....

Use for which building is put—1st.....

2nd.....

Any rubbish, waste, filth, rags, grease, paints, oils, papers, excelsior, boxes, inflammable or combustible material strewn about?—1st.....

2nd.....

What is it?.....

.....

Where is it?.....

.....

Are exits front and rear clear?.....

Is roof, attic and stairways clear?.....

What are heater conditions—as distance to woodwork, protection offered woodwork, galvanized ash cans used?.....

.....

.....

What are stove pipe hazard?.....

What are chimney conditions?.....

What are lighting conditions—as distance to woodwork, any swinging gas jets? .....

.....

Any fire pails or extinguishers close by?

.....

Any storage of gasoline or explosives on hand? .....

Shown through building by.....

Suggestions and directions given to.....

Nature of directions.....

.....

.....

.....

.....

.....

CHARTER AND MANUAL OF THE CITY OF TROY

Section 13, Chapter 235, Laws of 1893.

The chief and battalion chiefs of the said fire department shall be ex-officio fire marshals of the City of Troy. * * * The said fire-marshals shall have power and it shall be their duty to enter and inspect the buildings and dwellings within the City of Troy at reasonable hours of the day to ascertain whether such buildings and dwellings are safe from danger of fire. * * * Any person refusing to allow any such fire marshal to enter and inspect any such building or dwelling or refusing or neglecting to make such repairs after given notice thereof shall forfeit and pay to the City of Troy the penalty of fifty dollars to be recovered with costs in an action of any Court having jurisdiction. It shall also be the duty of said marshals to report in writing all violations of the provisions of this section.

Fire Prevention

City officials have realized for years that most of the fires are caused by improperly installed appliances, wrongful use of materials, faulty construction, the accumulation of rubbish, or those originating from arson, fraud or carelessness.

Fire Prevention

Is better than Fire Insurance for a reputable concern.

To the Chief:

Report on.....

Occupied by..... No.

Street..... No.

Inspected .....

I HEREBY CERTIFY, That I have examined the property mentioned herein and found conditions, and gave directions as reported herein.

Date .....

Name .....

FRONT

No. 1 **Department of Public Safety**

BUREAU OF FIRE—PREVENTATIVE MEASURES

Mr. ..... Troy, N. Y., ... 191..

It is found on inspecting your premises No. ..... that the condition of ..... is dangerous and liable to cause fire. This condition is in violation of City Ordinances. You are hereby notified to ..... within ..... hours.

CORNELIUS CASEY, Chief of Fire Bureau,

By .....

BACK

REPORT FORMS USED BY INSPECTORS OF FIRE HAZARDS IN TROY, N. Y.

ers announcing Clean-up Week. The work was under the supervision of the Commissioner of Public Works and his Deputy, and reflects much credit upon both for the thorough manner in which it was performed.

The regular fire prevention work of the Fire Bureau is performed by the captains and lieutenants, each of whom gives about two days a week to inspection work. The report to the Chief is made on the form reproduced on page 33. When it is necessary to notify an owner or occupant that dangerous conditions exist on his premises, the small form is used. The offender is given a certain number of hours to correct the condition, and if he fails to comply with the order he can be taken before a police magistrate and fined. By this regular, persistent work it is endeavored to minimize the fire danger in this industrial city.

CORNELIUS A. CASEY,
Chief of Fire Bureau, Department of Public.

City Managers

Pay Both in the Same Envelope

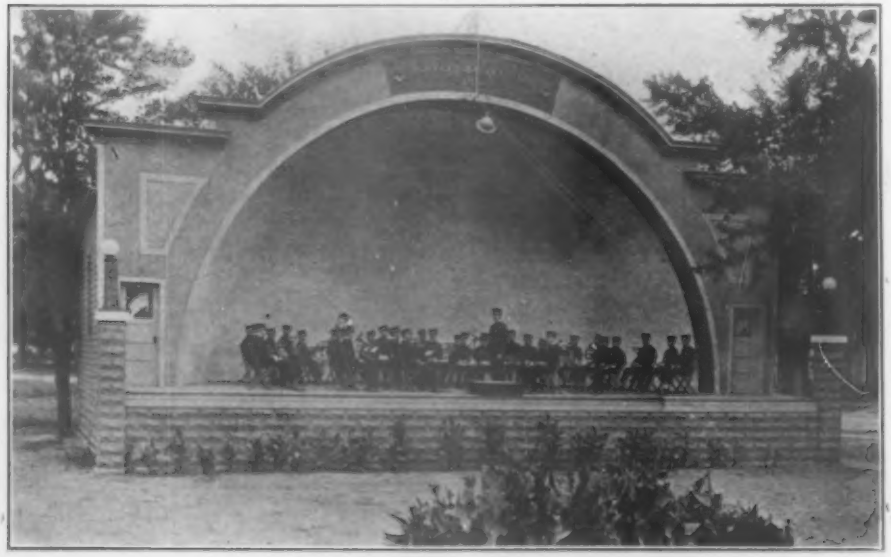
Glencoe, Ill.—Having discovered, like other municipalities, that too much time was required for the collection of vehicle and dog taxes, Glencoe hit upon a simple plan for expediting payments. The village owns its water service, and it was realized that everyone in the place who had a car or a dog was obliged to pay a water bill each quarter. Accordingly, a small sticker was affixed to the water bill reminding the citizen that his vehicle and dog taxes were due, and might be paid at the same time. The results of this scheme have been most gratifying, and the work of the collectors has been reduced, especially in reaching the newcomers to the village who had no knowledge of these special taxes.

H. H. SHERER,
Village Manager.

Recreation Departments

A Properly Financed Municipal Band

Salina, Kans.—More and more the eyes of the people are opening to the fact that band concerts are a very essential part of the life of a community. The band is a public service institution and is one of the town's best advertising mediums; to be-



THE MUNICIPAL BAND OF SALINA, KANS.

long to it or to listen to it creates home town interest.

The problem of financing has deterred many communities from organizing bands. The usual method has been to collect money, by subscription, from more or less willing business men. This has been unsatisfactory, for the reason that it puts the band on a charity basis and means disagreeable work for the soliciting committee. Also, the patient citizen who contributes receives no more benefit from the concerts than the less public-spirited man who does not. Further, the amount realized seldom provides sufficient funds to pay the total expenses of the band.

Although a band must pay for a hall and for lighting and heating it, buy music, uniforms and instruments and hire a leader, it is often expected to donate its services on public occasions. One of the most discouraging things that can happen to such an organization is to have out-of-town bands hired for important ceremonies, while the local band is asked to give its services when money is not available.

To correct this state of affairs, the first thing to do is to improve the band, and this is best done by concentrating upon one band, and assuring it of support as long as it is satisfactory. The management of a band cannot plan for the future with uncertain financial backing.

The experience of Salina shows how one city met the problem. Six years ago Salina had no band. In 1915 the Salina Boys Band was organized and existed on the dues paid by members and the money received from a few engagements. Later the City Council appropriated $600 a year, which kept the band going until the citizens authorized a tax levy for the support of a Municipal Band.

To secure popular support of the proposed tax a vigorous campaign was undertaken by obtaining the indorsement of the Chamber of Commerce, the Rotary Club and similar organizations. The daily papers assisted. On the night before the election an open air concert was given, and the next morning the band was out in cars, playing to remind the voters of their duty. The ballots showed a return of 4 to 1 for the levy.

Under a five-year contract with the Municipal Band, Salina now pays $5,000 per year, in return for which the band is to give 50 concerts. For each important occasion on which the band is called out by the Mayor, such as a convention, parade, or public meeting, credit is given for one concert. With the sum assured by the contract, the band meets all expenses, and is able to pay its members for concerts and rehearsals.

Weekly concerts are now being given on Friday nights in the band "shell" which was built by the city and the business men at a cost of $3,000. On Wednesday night the band visits the small towns in the county, giving concerts only—no speech-making is allowed. The citizens of the town, instead of joy-riding around in town or going to no place in partiular, pick up the members of the band and take the boys to the town visited. Sometimes we have as many as seventy-five or a hundred cars in the party. Thus the band assists in promoting good-fellowship between our town and its neighbors.

T. S. HOWELL,
Leader, Municipal Band.

Highway Departments

A City Tax on Gasoline

ST. LOUIS, MO.—Municipalities seeking new sources of revenue will be interested in the tax on the consumption of gasoline levied by the city of St. Louis. The ordinance was approved August 4, 1919.

It provides that all persons, firms or corporations selling gasoline must obtain a license. All licensees are required to file a quarterly statement with the Comptroller of the city showing the number of gallons of gasoline sold during the period. The amount of the tax, which takes the form of a fee for the license, is one-half cent for each gallon sold, payable at the end of the quarter.

The tax is stated to be an emergency measure, and the reasons leading to its adoption are set forth in the ordinance as follows:

"The greatly increased automobile traffic upon the streets of the city of St. Louis and the concentration of automobiles in some of the principal thoroughfares of said city, causes

an unusual wear upon the surface of said streets and requires extensive repairs and frequent reconstruction, the expense of which cannot be collected as benefits against the abutting property owners, and is occasioned by owners of automobiles in all sections of the city of St. Louis, and additional revenue is required to provide for the expense of such repair and reconstruction."

It is estimated that this year the tax will produce about $100,000, and this sum has been set aside in the annual budget for the reconstruction and maintenance of the principal thoroughfares.

C. M. TALBERT,
Director, Department of Streets and Sewers.

Libraries

School Children Coöperate with City Library

Mt. Vernon, N. Y.—The problem of teaching children to understand and accept personal responsibility for municipal property is being met successfully in Mt. Vernon, N. Y.

In the ten elementary schools, each class elects a leader, and each school two members to represent it on the governing board, or Library Council. This Council meets bi-monthly with the children's Librarian, the meetings being conducted by the president and secretary, elected by the Council. Each school takes supervision of the Children's Room for one week, during which time two members appointed by the school councilors are on duty to see that no books are taken without being charged, and to maintain general order. The Council also assumes charge of the collection of fines on books overdue. The matter has been one of personal, class, and school honor, and there has been keen rivalry among the schools to be the first to have a clear record.

An active part in the supervision of the room gives children a new interest in the Library, and the current discussion of problems of library and community is teaching them to view public property in a new light.

LOUISE F. SWIFT,
Children's Librarian, Public Library.

City Foresters

Our Friends the Trees

Newark, N. J.—So far as is known, the Shade Tree Division of the Department of Parks and Public Property of Newark was the first city department to issue an annual Arbor Day leaflet. We were familiar with the beautiful booklets on tree planting published by the several states, usually under their departments of education, but it was felt that the ideals for city streets in Newark could not be realized except by direct appeal to the citizens.

The most effective way to reach the largest proportion of the citizens is through the schools. After several years of this work, in which we had the coöperation of

There is rest and sweet enchantment
In the shadow of an Elm.

E L M

the Board of Education in distributing our leaflets, we prevailed on the school authorities to join us in their publication. Thus for a number of years the Board of Education has borne half the expense, as well as giving us potent aid in distributing the leaflets in the schools in connection with the exercises on Arbor Day.

One year we published a leaflet called "The Tree Calendar," containing sketches of the activities of the trees from month to month, and telling how the children could help the trees in each season. Another leaflet entitled "Know Your City Trees" pictures striking contrasts between ideally planted streets and a treeless desert, and contains the addresses (street and number) of the worthies of our local tree world. Another year an eight-page pamphlet was issued under the title "Four Centuries of Trees in Newark." It gave snapshots of comment from old records and letters showing that we had cared for our trees in each century of our history, the oldest ordinance for the protection of trees dating back to 1676, ten years after the founding of the settlement in the wilderness. The 1918 leaflet was devoted to war gardens.

The 1920 pamphlet was twice as large, and opened with a statement by the Superintendent of the Shade Tree Division of the Department of Parks and Public Property, introducing the school children to the trees, the other pages being devoted to pictures of the more common trees of the locality, in silhouette, as on page 36, with a descriptive verse beneath each one. The pamphlet is not only artistic in itself, but serves its purpose of introducing the children to the trees, by making them familiar with the typical outline of the various species.

CARL BANNWART,
Superintendent Shade Tree Division, Department of Parks and Public Property.

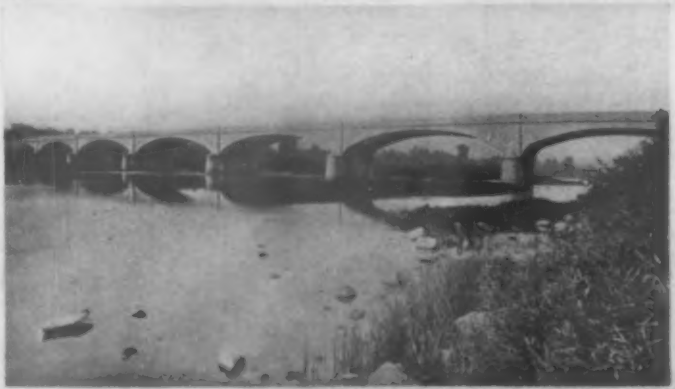
What Do Playgrounds Cost, and Are They Worth While?

THE table given below has been compiled from information furnished by Miss Mildred A. Clough, City Clerk of Kalamazoo, Mich., who submitted a questionnaire on playgrounds to cities of between 30,000 and 50,000 population.

It is notable that the verdicts from those cities which reported the heaviest expenditures are the most enthusiastic and outspoken. Brookline, Mass., which paid $500,000 for its playground and spends $7,100 yearly on its up-keep, regards it as a "paying investment." Fitchburg, Mass., appropriating $5,000 a year on its six playgrounds, says that "no feature of the city has done so much good." Macon, Ga., already spending $8,000 a year, intends to establish a playground for colored children. Newton, Mass., appropriates annually $21,000 to $25,000 for supervision, maintenance and equipment, and the opinion of its citizens regarding the work is shown by the fact that last year a new playground valued at $125,000 was donated to the city. The final word of approval comes from East Orange, N. J., which votes $8,500 for annual costs: "It is the only thing taxpayers never complain about."

City	Cost of Equipment	Cost of Maintenance (Annual)
Amsterdam, N. Y.	$1,800.00	.....
Auburn, N. Y.	.....	$1,744.00
Aurora, Ill.	5,000.00	.....
Brookline, Mass.	5,000.00	7,100.00
Butte, Mont.	3,100.00	3,000.00
Cedar Rapids, Ia.	305.00	500.00
Charlotte, N. C.	500.00	1,000.00
Colorado Springs, Colo.	3,500.00	2,500.00
Columbia, S. C.	3,500.00	4,000.00
Dubuque, Ia.	1,500.00	1,000.00
Easton, Pa.	5,000.00	1,500.00
East Orange, N. J.	13,500.00	8,500.00
Everett, Mass.	400.00	.....
Fitchburg, Mass.	5,000.00	.....
Fresno, Calif.	17,500.00	.....
Jackson, Mich.	1,500.00	2,000.00
Jamestown, N. Y.	.....	1,900.00
Kenosha, Wis.	5,748.54	1,500.00
Lansing, Mich.	300.00	350.00
Newport, Ky.	.....	.....
Lima, Ohio	2,500.00	.....
Lorain, Ohio	2,000.00	.....
Lynchburg, Va.	2,000.00	2,500.00
Macon, Ga.	2,500.00	8,000.00
Madison, Wis.	1,000.00	2,000.00
Mt. Vernon, N. Y.	69.81	1,164.21
Newport, Ky.	1,000.00	1,000.00
Newport, R. I.	1,000.00	5,500.00
New Rochelle, N. Y.	2,400.00	9,374.00
Newton, Mass.	4,000.00	19,500.00
Norristown, Pa.	1,000.00	.....
Orange, N. J.	25,000.00	8,575.00
Oshkosh, Mich.	.....	6,293.97
Perth Amboy, N. J.	.....	2,500.00
Pittsfield, Mass.	1,500.00	3,000.00
Poughkeepsie, N. Y.	30,000.00	2,500.00
Shreveport, La.	.....	500.00
Springfield, Mo.	3,000.00	5,000.00
Taunton, Mass.	1,500.00	2,829.50
Waltham, Mass.	8,000.00	4,000.00
Williamsport, Pa.	1,200.00	600.00
Wilmington, N. C.	2,000.00	.....
Woonsocket, R. I.	4,000.00	500.00

The Evolution of River Crossings



FROM THE FERRY AND THE NOW OBSOLETE COVERED WOODEN BRIDGE, TO THE PERMANENT REINFORCED CONCRETE STRUCTURE OF TO-DAY

New Developments in Bituminous Concrete Pavements

By Theodore S. Oxholm

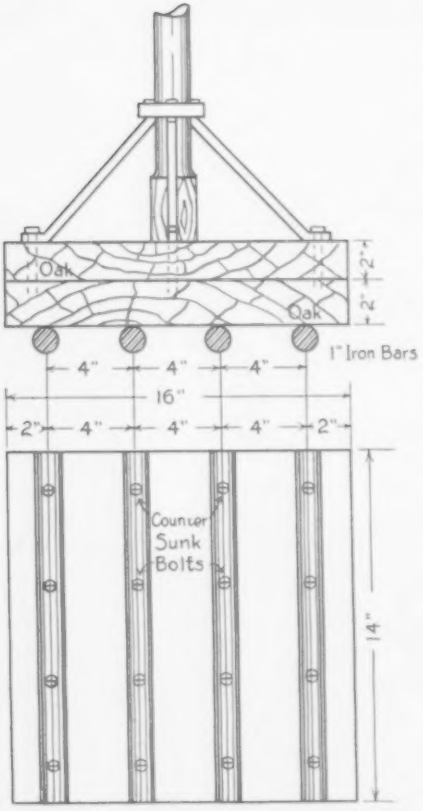
Acting Consulting Engineer, Bureau of Engineering, Borough of Richmond, New York City

IN these days of vast expenditures for new roads and pavements the art of road-building has advanced rapidly from the practice of the former road overseer or commissioner of highways of a few years ago to the standard methods now employed by civil engineers, many of whom have had the privilege of taking a special course in highway engineering now offered by several of our leading colleges and universities. It is becoming increasingly difficult, therefore, to devise methods of construction which have merit and yet are not generally known to the profession.

Last spring the author, at the invitation of A. Swan, Jr., C. E., City Engineer of Trenton, N. J., made an inspection of sheet asphalt pavements in that city which were laid directly on the concrete foundation without a binder course. Mr. Swan explained that by the use of a special corrugated tamper designed by himself he had corrugated the concrete base so deeply and uniformly at right angles to the traffic that there has been no creeping of the asphalt wearing surface under heavy use for two or more years, and a considerable saving in cost had resulted by leaving out the binder course.

In the borough of Richmond the author has been using for some years concrete for pavement base composed of trap rock screenings instead of broken stone and sand, mixed six of screenings with one of cement. It was determined in a certain contract to use Mr. Swan's tamper. After about 300 feet had been tamped the assistant engineer, inspector and foreman on the work devised a roller made of a 2½-foot section of telegraph pole with bands of 1-inch round iron fastened around the roller and spaced 4 inches on centers; a long pole attached so that the roller could move easily, completed the outfit. The water was squeezed out of the concrete by a light roller, as used for concrete pavement, and then as the concrete was beginning to set, the corrugated roller above described was rolled across the base once for each section. The result was most gratifying, as a perfect series of depressions appeared 1 inch deep and 4 inches apart, uniform in character and extending the whole width of the base. It will readily be seen that this "washboard" surface will receive the asphalt or bituminous concrete and lock it so firmly to the base that creeping from lack of proper contact is pre-

THE AMBOY ROAD, STATEN ISLAND, NEW YORK, A BITUMINOUS CONCRETE PAVEMENT ALMOST CONSTANTLY SUBJECTED TO HEAVY TRAFFIC



SKETCH OF THE TRENTON, N. J., TAMPER

vented. It is thought that much of the creeping and rippling of the surface of bituminous concrete road surfaces is due to lack of proper contact with the base.

Proper Methods of Construction Which, Because of Their Neglect, Need Emphasis

Very often an old macadam road 5 or 6 inches in depth makes a suitable base for a bituminous surface, provided drainage conditions are or can be made good. Care must be taken, however, in preparing the old surface to make it as rough as possible so as to prevent creeping of the new surface. The bond of the old pavement must not be broken, for if it is its value is largely destroyed. Almost all old macadam roads are now surfaced with road oil, which presents a smooth surface in patches. The best method of removing this oil surface appears to be the old-fashioned one of picking by hand lightly so as not to disturb the bond of the heavier stone. Some roads of this type which have been built by the author are very inexpensive and are giving good service. They are edged with old stone paving block set in sand before the bituminous wearing surface is applied.

The subject of drainage is an important one to the road-builder. It is generally overdone, resulting in useless cost, or underdone, resulting in great damage to the pavement. It is not difficult for the engineer to tell with approximate accuracy where drainage probably will be necessary, and to make his preliminary estimates accordingly. Springs and wet places may be noted, and where changes of grades make additional cuts he should be prepared to underdrain when the work is under way and trouble has developed. The old-style stone drains, while efficient for a time, usually fill up in a few years, and damage is sure to follow. The author uses 6-inch vitrified pipe with open-covered joints in all trench drains, which, with suitable outlets, will give good service for many years.

One of the most important pieces of road work in the borough of Richmond which have been completed during the last few years is the paving of the Amboy Road, 9 miles in length, running through the center of Staten Island and forming part of the main-traveled route between New York and Philadelphia, Baltimore and Washington, and also New Jersey coast resorts. Three years ago work was begun on a contract for improving this road with bituminous concrete wearing surface 2 inches thick on a 6-inch concrete base. The specifications called for the use of Bermudez asphalt, as the traffic was very heavy. The pavement was laid 20 feet wide, and concrete edging 6 inches in width was built up monolithic with the base. Four-foot earth wings were graded down to a uniform ditch along the sides, except where passing through built-up sections where curbs and gutters already existed. The total cost of the work was $330,000, at prewar prices, and after two years of service the appearance of this pavement is excellent and practically no repairs have been made. On the first section of about 3 miles it was noticed during the suspension of work for the winter that some transverse cracks had appeared; it was therefore decided to cut ¼-inch joints across the pavement as it was being laid, 300 feet apart, and fill with

asphaltic cement. On the remainder of the work this was done, and no more cracks have occurred.

As the bituminous material for the wearing surface is brought onto the street it is dumped onto the base and shoveled into place for the rakers. The shovelers tread down the hot mixture so that it becomes compressed before the roller reaches it. This causes an unequal density in the completed work and tends to make the pavement uneven. One method of avoiding this is to have the entire amount of each load of hot mix shoveled and spread in adjoining locations. This causes the breaking up of the portion treaded down, and the rakers soon reduce the heavier portions to a uniform surface ready for rolling. Proper protection to the edges of bituminous pavement should always be provided, but is often neglected. If old paving blocks are not available, either concrete edging or a steel angle iron of proper design, anchored into the conerete base, will protect the pavement from undue wear. The failure to provide this protection soon results in the reduction of an 18-foot road width to one of 16 feet, and the narrower the road gets the more rapidly the pavement deteriorates.

Bad Practices Which Should Be Eliminated

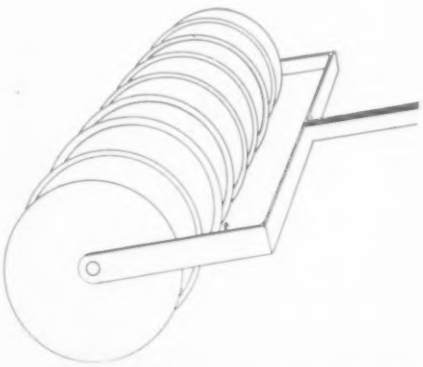
The placing of a bituminous concrete wearing surface on top of an old penetration macadam road as a base is sure to result in serious damage to the pavement. Wherever an excess of road asphalt exists in the original pavement, it will soften the new wearing surface over it and disintegrate it within a year.

While a liberal use of the oil burner in preparing the foundation will improve this condition considerably, yet in the author's opinion this form of old pavement provides a very poor base for a hot-mix wearing surface.

Where an old water-bound macadam pavement has been covered with 3 or 4 inches of penetration macadam, and it is desired to place a new wearing surface of bituminous concrete, the author has had good results from removing the penetration pavement entirely and forming a new crown and repairs to the old macadam with new ¾-inch stone and screenings.

One of the most important defects in bituminous pavements, and one which is undoubtedly caused by the great loads being carried by enormous trucks, is a pushing forward of the top of the wearing surface, creating waves and ripples that sometimes are so marked that the bituminous material has to be removed and replaced. In the opinion of the author, this is caused by requiring a too high penetration test in the asphaltic cement. The test has usually been placed at from 50 to 70 in cities near New York, but latterly the borough of Manhattan has gone to the other extreme and laid pavements at a penetration of 30. While the author believes that cracks in bituminous surfaces are preferable to ripples, and can be more economically repaired, yet a medium hardness should be called for; he suggests 45 to 50, and has been laying considerable pavement at 48 during the past summer.

Bituminous pavements adjoining the rails of street car tracks should be protected from disintegration caused by vibration of the rails. In many cities this has been neglected. It is impossible to properly compact the bituminous material under the head and flange of the rails. The vibration during the passage of cars destroys the bond of the bituminous material, allowing surface water to enter the space thus formed, and resulting in the final disintegration of the pavement. This defect may be obviated by the use of stretcher courses of stone blocks along both sides of the rails. The width of the stretcher area should be sufficient to permit the ordinary rail repairs to be made without cutting into the bituminous pavement.



CORRUGATED ROLLER TAMPER DESIGNED AND USED IN THE BOROUGH OF RICHMOND, NEW YORK CITY

Another method of construction is to pave up to a steel angle iron laid parallel to and adjoining the rails, the pavement then being practically independent of the railroad tracks.

The proper way for an engineer to find out defects in his own practice is to visit periodically other localities. He will generally find some condition better cared for than at home, and sometimes may find that he has solved a certain problem better than his brother engineer.

Acknowledgment.—From a paper prepared for, but not read, at the annual convention of the American Road Builders' Association.

Sewer Explosions

By G. W. Jones and V. C. Allison
Pittsburgh Experiment Station, U. S. Bureau of Mines

BECAUSE of the increased use of gasoline arising from the large number of automobiles, motor trucks and other gasoline-driven vehicles, also the large consumption of gasoline and other volatile liquids by cleaning works, paint factories and similar manufacturing establishments, there have been created new conditions to which present-day municipal engineers and chemists must give careful attention and consideration, namely, explosions in sewers due to the above sources.

During the period from 1913 to 1916 sewer explosions were especially numerous. Two explosions in Pittsburgh causing a great amount of damage, and others reported in New York City, Detroit and elsewhere, brought these new dangers forcibly to the attention of the public and of city governments. In Pittsburgh a coöperative investigation between the city and the United States Bureau of Mines was started to determine the causes and conditions which would produce explosions in sewers due to the accumulation of gasoline vapor. This investigation extended over the most of 1914, and many valuable data were obtained.*

During the last few years very little has been said or done in regard to sewer explosions from gasoline. Either the public has been educated concerning the hazards of dumping gasoline into sewers, perhaps largely through municipal regulations, or conditions have been unfavorable for the ignition of explosive mixtures when favorable explosive concentrations have arisen. At any rate, with the increased use of gasoline during the last few years and the present outlook for an even greater consumption in the future, dangers from these sources will require the attention of municipal authorities of all cities where gasoline is used in large quantities. Some cities have passed ordinances to prevent the dumping of inflammable wastes into sewers or to regulate the manner in which these wastes may be disposed of.

* Burrell, G. A., and Boyd, H. T.: "Quantities of Gasoline Necessary to Produce Explosive Conditions in Sewers." Technical Paper 117, U. S. Bureau of Mines, 1916.

The Record of Explosions

Of the larger sewer explosions may be mentioned the two occurring in Pittsburgh, one in November, 1913, and the other in July, 1914. The causes of these explosions were not definitely determined, but the drainage was from a district containing a large number of garages and users of gasoline. Damages from the first explosion amounted to over $300,000. Several explosions have occurred in New York City. One is reported from that city in 1907; also in 1914 a sewer in East 42d Street exploded three different times. The damage was not extensive, since the sewer was 40 feet below the street level. Several are reported from Detroit. One occurred in January, 1914, and another in March, 1916. The damage from the one in 1914 was slight, amounting to about $7,000. The cause was laid to gasoline from automobile establishments. The 1916 explosion was due to the leaking of some 10,000 gallons of gasoline from a tank car into the sewer. The leakage from the tank car was caused by the freezing of the water trap on the bottom of the car and the forcing of a leak in the outlet valve. New Haven has had several explosions, the causes of which in most cases were doubtful, although some may have been due to gasoline. Explosions have been reported from Philadelphia,

Providence, Buffalo, Washington, Brooklyn, Cleveland, Los Angeles, San Francisco, Savannah, Baltimore, Louisville, Charleston, St. Paul, Hartford, Duluth and Kansas City.

Causes of Explosions

Many explosions in different cities have been definitely attributed to gasoline, some were due to illuminating gas, and others were of doubtful origin. In general, sewer explosions are due to one or more of the following causes: artificial or natural gas, inflammable wastes, sewer gas and gasoline. Other causes may be responsible in isolated cases, but the major number will fall under one of the above heads.

Natural or artificial gas may find its way into the sewer-mains by infiltration through the ground from leaky gas-mains in quantities large enough to produce explosive mixtures. The explosive limits of these gases are higher than that of gasoline, and larger quantities are necessary to produce explosions. On the other hand, these gases will diffuse much faster, and explosive conditions are quickly reached. If sewer manholes are ventilated, the gas in a short time passes out because of natural ventilation, and the explosive condition lasts only a short time.

It has been found that the greater number of explosions in sewers due to natural causes occur in stormy or flooded conditions, as after a thaw or heavy rain. This may be due to one of two things. Flooded conditions may cause the outlet of sewers to become submerged. Burrell found that sewers in this condition are very dangerous when gasoline is introduced in appreciable amounts. A great number of gasoline vehicles are continuously losing oils and gasoline wastes upon the streets, and this, with other inflammable refuse thrown upon the ground, is allowed to accumulate. These wastes do not evaporate readily in cold weather, but remain until a rain or thaw washes them into the sewers. On reaching the sewers the submerged outlets favor the accumulation of the gasoline vapor and give the inflammable liquids time to vaporize at the sewer temperature. If this is true, we may expect dangers from this source in the future and of greater frequency. Although each gasoline-driven vehicle may contribute only a small amount, the sum total of the thousands traveling the city streets in the aggregate may produce dangerous conditions.

Garages, dry-cleaning establishments and certain plants manufacturing paints, varnishes and similar products use large quantities of inflammable liquids. These are used until too dirty for further service, and are then disposed of in the easiest manner possible, often by dumping them into the sewers. Other wastes in addition to gasoline are benzol, washings from automobiles and the like, which may find their way into the sewers.

Another cause may be sewer gas. The decomposition of organic matter produces methane along with nitrogen, carbon dioxide and perhaps small quantities of other gases. In certain cases such as dead ends of sewers where deposits are allowed to accumulate and ventilation is poor, methane may be produced in dangerous proportions. Methane is a gas of a high rate of diffusion and may easily find its way out of the ventilated manholes. Other gases are produced along with methane, and the oxygen is used up in bringing about the decomposition of the organic matter, leaving an excess of inert nitrogen. This atmosphere usually is deficient in oxygen, and an explosion cannot occur. The danger from sewer gas is more that of suffocation of unprotected workmen than the producing of explosions. Sewers of a large capacity have usually a high rate of discharge, and conditions favorable for the production of sewer gas are eliminated.

Ignition of Gases in Sewers

Explosions in sewers may be brought about by open lamps or flames carried into them by workmen, sparks from street car tracks near the manholes, hot cinders or sparks from locomotives, sparks from tools used by workmen in the sewers for making repairs or prying off the manhole covers. In every city there are a great many conduits carrying electric wires for electric lights, telephone and power cables. These may possibly give stray currents which in turn produce sparks in the sewers.

Quantities of Gasoline Necessary to Produce Explosive Conditions in Sewers

Tests made by the Bureau of Mines indicate that the dangers resulting from small discharges of inflammable wastes from a

large number of sources are not nearly as great as one would be led to believe, providing the sewers do not have submerged outlets, and that to create explosive conditions it is necessary that large quantities be dumped into the sewer and over a short period of time. No fast limits can be given, since the conditions in any two sewers are not the same. Some of the factors affecting the explosibility are volatility of the gasoline or waste, temperature of the sewer and sewage, pitch or rate of flow, volume of air space above sewage, and the mechanical construction—for example, open flow or submerged outlet.

Volatility of the Gasoline.—In a general way the hazard or tendency for producing explosions increases with the volatility of the gasoline present, or, what amounts to the same thing, its vapor pressure. Some low-grade gasolines and kerosenes at the ordinary sewer temperature have vapor pressures so low that explosive conditions are impossible.

Temperature of the Sewer.—The sewer temperature is a very important factor governing explosive conditions. Gasoline wastes having too low a vapor pressure at ordinary temperatures may easily produce explosive conditions by a rise in temperature. Vapor pressures of gasolines increase very rapidly with a small rise in temperature. Increased temperatures in sewers may be brought about in certain locations by introduction of live steam or hot liquid.

Rate of Flow.—Gasoline requires time for its vapor pressure to reach equilibrium with the air in contact with it. With a certain gasoline having a certain vapor pressure at a certain temperature, a certain amount of gasoline vaporizes until its maximum vapor pressure at that temperature is reached. Since gasoline vapor is several times heavier than air, diffusion is very slow unless agitated by air currents. In this case only a very small film of air above the gasoline contains gasoline vapor, and only the air film immediately in contact with the gasoline takes up an amount equal to the vapor pressure of the gasoline. The air a few inches above the gasoline may be practically free from gasoline vapor unless a considerable length of time is allowed for diffusion. A sewer with a high rate of flow removes the gasoline waste from the sewer before the gasoline has time to vaporize to its fullest extent. Also, the vaporized gasoline in contact with gasoline, since it is very much heavier than air, is carried along with the sewage by friction and discharged with the sewage without reaching the upper air stratum in the sewer.

Volume of Air Space.—A given surface of gasoline vaporizes at a rate depending upon its temperature, other conditions being constant, and the time necessary to make a given space explosive will depend upon the volume of the inclosed air space. In other words, of two sewers with the same surface of gasoline exposed at the same temperature, the one with the larger air space above the gasoline will require the longer time to produce explosive conditions.

This fact may explain why explosions in sewers are more common in rainy or stormy weather. The sewers become nearly filled with water, and only a small air space is left above the sewage. This small air space is more quickly made explosive than at other times when the air space is large in comparison to sewage.

Open and Submerged Outlets.—All the above factors produce favorable conditions for explosions of the sewer has a submerged outlet. Gasoline is lighter than sewage and floats on the top. The entrapped gasoline accumulates, since there is no way of its getting out. In a very short time a large amount may accumulate, and in the flooded condition there is only a small air space in contact with the gasoline, and it remains in contact with this small air space until it has had time to make explosive all parts of the air space. If time is given and there is sufficient gasoline present, explosive conditions will result throughout the entire sewer.

On the other hand, open-flow sewers carry gasoline wastes out of the sewer usually before an appreciable amount has had time to vaporize, at least to produce explosive conditions. The film of air in contact with the sewage, which may be explosive, is carried along with the sewage by friction and discharged at the outlet.

The Results of Investigations

In order to study the conditions which produce explosions in sewers, the United States Bureau of Mines and the city of Pittsburgh coöperated in making tests in a representative sewer in Pittsburgh. The Negley Run sewer, which drains a large section of

the city, was chosen. It is 8 feet 3 inches wide by 8 feet 6 inches deep. The entire distance from the manhole where the gasoline was introduced to the outlet into the Allegheny River was 2,706 feet. The velocity was determined by dropping pine floats into the upper manhole and noting the time taken to pass each succeeding manhole. The average velocity of the sewage was found to be 6.45 feet per second. The depth of flow was about 8 inches and the grade 0.90 per cent. In the first test 55 gallons of refinery gasoline at a specific gravity of 67.5° Be. was dumped into the sewer at the upper manhole all at once. Samples of the gas were taken at the different manholes at short intervals and analyzed. Mr. Burrell made the following comment:

"One gallon of gasoline if entirely vaporized produces about 32 cubic feet of vapor at ordinary temperature and pressure. If 1.5 per cent of gasoline be adopted as the low explosive limit of mixtures of gasoline vapor and air, 55 gallons of gasoline would produce enough vapor to render explosive the air in 1,900 linear feet of a 9-foot sewer, provided the sewer air and the gasoline vapor were perfectly mixed. It will be noted how far theoretical conditions differ from the conditions of the test as follows:

First, the gasoline flowing with the sewer water was rapidly carried past any particular point; second, only the lighter parts had a chance to evaporate at any point, and, third, gasoline vapor is about three times as heavy as air, so that mixing of vapor with air at an appreciable distance above the sewer water would be slow. The significant fact is that 2.19 per cent was the largest quantity of gasoline vapor in any sample. Only very small proportions were found at any manhole 10 minutes after the introduction of the gasoline.

It is evident that one barrel of gasoline (55 gallons) poured all at once in a manhole of a fast-flowing sewer renders the air explosive for only a few minutes at any particular point."

Tests were also made on the same sewer to study the effect of submerging the outlet. "The results of the tests prove that with a sewer submerged by high water, extremely dangerous conditions can result from a small amount of gasoline." The test proved that when as little as 5 gallons of gasoline or light oils were allowed to escape at one point, as from garages and dry-cleaning establishments, highly dangerous conditions may result.

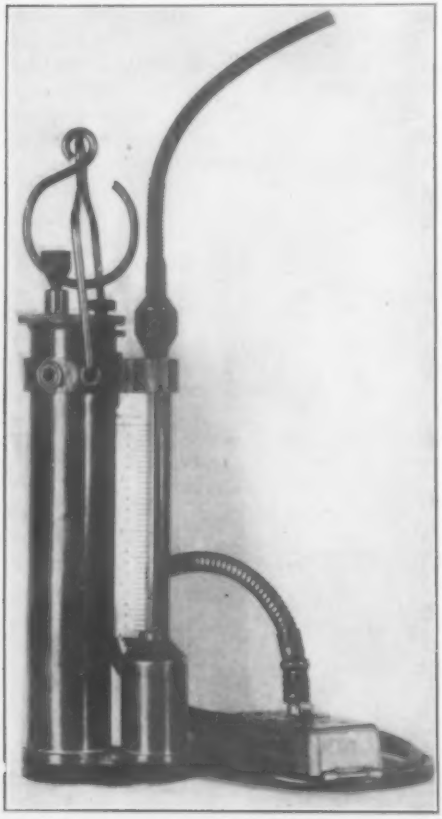
Out of 6,553 tests made by the city of Pittsburgh, only 4 showed 0.5 per cent of gasoline vapor or over. These tests were made over a period of about one year. This indicates that small discharges of gasoline into sewers do not create dangerous conditions normally unless the outlet is submerged. Troubles are generally caused by large quantities introduced all at once. In every case the explosive mixture was close to the surface of the water and did not extend far into the upper air.

"When the sewer was bulkheaded to parallel conditions such as would prevail if the sewer outlet was submerged, a dangerous condition resulted from dumping one barrel (55 gallons) of gasoline at the rate of 5 gallons per minute into the sewer at one point. At some places there existed a dangerous atmosphere 5 hours after the gasoline had been dumped in."

Explosive Limits of Gasoline Vapor and Air

No exact figures can be given for the explosive limits of gasoline vapor and air mixtures unless the conditions under which the explosion was produced are carefully stated. The explosive limits vary, depending upon the size, shape and material of the containing vessel, method of ignition (that is, whether the explosion takes place upward or downward), source of ignition (for example, a flame, electric sparks, incandescent filaments), also to a less extent upon the effect of pressure and temperature. In general, when considering the paraffin hydrocarbons, the higher the molecular weight the narrower the explosive limits. The explosive limits of methane are: low limit 5.5 per cent.* high limit 14.5 per cent; methane, low 2.5 per cent, high 5 per cent; and gasoline, low 1.5 per cent, high 6.0 per cent. G. A. Burrell made extensive tests on the explosive limits of gasoline vapor, trying different sized containers and sources of ignition. When using a Hempel explosion pipette of 100 c.c. capacity, using mercury as the confining liquid and sparking with an induction coil across platinum terminals, the lower limit of complete inflammation was found to lie between 1.9 and 2.0, with an upper limit of 5.4 per cent. He next tried a 2,800 c.c. vessel, and the mixture was sparked by drawing two copper wires apart through which a current was

* Burrell, G. A., and Gauger, A. W.: "Limits of Complete Inflammability of Mixtures of Mine Gases and of Industrial Gases and Air." Technical Paper 150, Bureau of Mines, 1917.



APPARATUS FOR DETECTING LOW PERCENTAGES OF GASOLINE VAPOR IN SEWERS

flowing. The results were: low limit 1.5 per cent, and upper limit of complete inflammation between 6.0 and 6.4 per cent.

The Ignition Temperature of Gasoline-Air Mixtures

"The ignition temperature of a gas is that temperature to which gases [gasoline and oxygen in this case] must be heated, so that when brought in contact with one another they will immediately inflame" or "that temperature at which rapid self-heating takes place." The ignition temperature as found by Burrell is about 530° C.

Detection of Gasoline

A. D. Little describes an apparatus for detecting gasoline vapor in sewers.* The device was such that tests could be made in the field. In this way many samples could be determined in a day, and first-hand information was obtained as to the conditions in any particular sewer. The apparatus consisted of a long rubber sampling tube aspirator connected to the outlet cock of a priming spark plug. The sample of gas is taken in a collapsed rubber balloon slipped over the end of the spark plug. When the balloon is inflated with the gas sample, a spark is established at the terminals of the plug, and if gasoline vapor is present in any amount from about 1.1 per cent up to a mixture too rich to explode, it will manifest itself by a sharp explosion bursting the rubber bag. If the mixture is suspected too rich, the sample is diluted and sparked again. O. Hufeland† makes use of an ordinary automobile pump to fill toy balloons in which the samples are taken. A long tube extends into the sewer, and the gas is drawn out by means of the pump. The gas from the toy balloon is forced against a lighted match, and it is noted whether an explosion takes place.

In order to meet the demand for an apparatus to detect lower than inflammable percentages of gasoline in the sewers, the following apparatus was devised‡ by the Bureau of Mines for the purpose of detecting small percentages of gasoline vapor. It is very desirable to have an apparatus that will detect low percentages of gasoline in order that dangerous conditions may be properly dealt with before explosive conditions are reached.

The principle upon which the operation of this instrument or detector is based is simply that the contraction in volume obtained by burning the gasoline out of a sample of gas is proportional to the amount of gasoline present in the original sample. The combustion takes place in the detector itself through the action of a platinum glower heated with an electric current, the detector and the small battery which furnishes the current being a complete unit. The contraction is measured and indicated on a scale previously calibrated to show the per cent of gasoline directly. When the sample is explosive, some of the water is forced out of the instrument, but no harm is done, since the detector is of a rugged construction. If the sample is above the

* Little, A. D.: "Detecting Gasoline in Sewers," *Municipal Journal*, Vol. 38, 1915, page 476.

† Hufeland, O.: "Explosions in Sewers," *Engineering Record*, September 12, 1914, page 307.

‡ Milligan, L. H.; Crites, D. O., and McKitterick, J. I.: "A Study of the Burrell Gas Detector for Combustible Gases."

explosive limit, the gas on burning expands and gives a negative reading. The detector is shown in detail in the second illustration. Essentially it is a U-tube which is nearly filled with water; the sample is drawn in the sample chamber *p* by opening the inlet valve *b*, blowing into the rubber tube *d*, until the water appears in the cup *a*, and then releasing the rubber tube and allowing the water to regain its original level. The outlet valve *b* is closed and the glower *h* heated white hot by passing an electric current through it. The glower burns out the gasoline vapor. When the combustion is complete, the current is turned off and the detector shaken to cool the gases to normal temperature. The water in the large reservoir rises in the sample chamber *p* to take the place of the gasoline vapor which was burned, and the water level in the gauge glass drops to a point on the scale indicating the per cent of gasoline vapor. The current for heating the glower is obtained from an Edison mine lamp battery. It requires about four minutes to make an analysis. The apparatus has an interchangeable scale for different gases. The photograph shows the instrument with a methane scale. The gasoline scale extends from 0 to about 1.5 per cent. The range is from about 0 to the lower explosive limit.

Gasoline as low as .04 per cent in air can be detected by smell, while with benzol much lower quantities can be detected in this manner. Other gases are usually present in sewers which tend to obscure the gasoline odor. When apparatus for analyzing the gases is not at hand, this method may be of value for detecting the presence of gasoline vapor.

Municipal Regulations for the Disposal of Inflammable Wastes

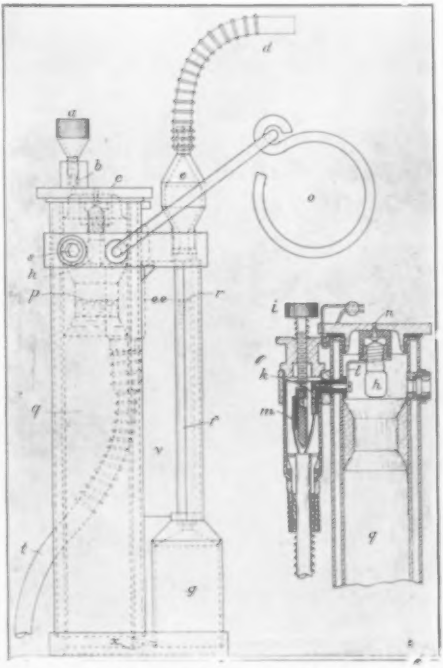
In an endeavor to prevent explosions from inflammable wastes, many cities have passed ordinances regulating the manner in which these wastes may be disposed of. The authors are familiar with only a few such regulations that have come to their attention. Many other cities may have better means of controlling the situation than the regulations which follow. An extract from the code of ordinances of the city of New York is as follows:

Section 561.—No connection with or opening into any sewer or drain in the city of New York, either public or private, shall be made for the conveyance or discharge, directly or indirectly, into said sewer or drain, of any volatile inflammable liquid gas or vapor; it being noted that a volatile inflammable liquid is any liquid that will emit an inflammable vapor at a temperature below 160° F.

Section 562.—Every occupant of any premises which may be connected with a sewer or drain, public or private, who shall use or permit or allow to be used said sewer or drain for such purposes as hereinbefore specified in Section 1, and every owner of any premises who shall use, permit or allow the use of such sewer or drain for such purposes shall be deemed to have violated the provisions of this ordinance and shall be guilty of misdemeanor and shall be punished upon conviction thereof by a fine of $50 or imprisonment for 30 days (Ord. app. July 6, 1906).

Extract from the Regulations of the Municipal Explosive Commission:

Section 276.—No garage permit authorizing the storage of a volatile inflammable oil shall be issued for any premises which are not provided with an oil separator, trap or other similar apparatus attached to the house drain for the purpose of preventing volatile inflammable oils from flowing into the sewer, provided, however, that the Fire Commission may, upon the recommendation of the Municipal Explosive Commission, exempt from the



DETAIL OF DETECTOR DEVELOPED BY THE BUREAU OF MINES

requirements of this section a garage draining into a short sewer line.

Section 396.—Each oil separator installed in a garage shall be connected to the house drain, and shall be so arranged as to separate all oils from the drainage of the garage.

In general, regulations require the installation of oil separators at places where appreciable quantities of gasoline are used. These generally work on the principle that gasoline and oil being lighter than water or sewage will float on the top, while the sewage is discharged from the bottom. The apparatus in every case should be simple in construction and work efficiently with all classes of sewage. There should be no sharp bends, valves or constrictions which may clog; otherwise its utility may be of no value.

The authors have attempted to give a summary of the conditions by which gasoline may become a dangerous factor at the present time in producing explosions in sewers, and to bring to the attention of the public and officials alike that although no very large sewer explosions have occurred during the last few years, this false sense of security should not induce municipalities to become negligent in enforcing regulations, since they may save a city in the end not only a large sum from damages but also the inconveniences which usually accompany explosions of sewers. Broken sewers may cause the spreading of diseases, flooding of homes and manufacturing establishments, and disorganization of public utilities near the district, which are of vital importance to the public at large. Wherever possible, sewers should be constructed with an open flow of as high a pitch as possible. If necessary to have submerged outlets, some method of mechanical ventilation should be installed. This is an expensive method and will not appeal to city engineers in general.

Large users of gasoline should be made to install mechanical separators, as are now required by some cities, and a rigid system of inspection should be provided. Frequent tests of sewer gases should be made, especially in the so-called "garage zones," for gasoline vapor. Testing apparatus should be used which will indicate as low as 0.1 per cent of gasoline, so that preventive measures may be taken before explosive conditions are reached.

Regulations should be provided for the storage of gasoline and inflammable wastes. If stored above ground, provisions should be made for disposing of it in case of leakage without its going into the sewers. If stored under ground, the tanks should be insulated from any possibility of leaking into the sewers by seepage.

Offenders should be rigidly prosecuted if the offense is due to negligence, and the public should be educated to the dangers of using the sewers for disposing of inflammable wastes.

Need for Coördinating Railroad and City Planning

By Walter McCulloh
Consulting Engineer, Niagara Falls, N. Y.

The town planner thinks of the ideals of wide streets, curved lines, rolling grades and all those arrangements which make for beauty and attractiveness. The railroad planner thinks of tangents and profiles, and endeavors to reach his objective with a minimum of curvature and a minimum of grades, consistent with cost of construction and operation.

Both are right, but when the railroad is in the city and a change of location is desirable, these two planners must become allies, not enemies. Neither the railroad nor the municipality which they represent should resort to the "steam roller method" of settlement of so important a question.

A review of the history of the railroad locations in New York and the New England States shows that the town was usually the first on the ground, and the railroad, following the practice of economical location and with a desire to reach business, passed as near to the heart of things as was practicable, where its freight and passenger business might be handled with the least expenditure of money and effort on its part and where the business from the community might be easily secured.

The town grows around and close to the railroad, until sooner or later its growth makes a plan for future development an absolute necessity.

Motor-Busses Will Aid Better City Development

But the Community Must Be Prepared to Pay a Higher Rate for Motor-Bus Than for Modern Trolley Transportation, with Which It Should Be Coördinated

By Walter Jackson

Consultant on Bus and Car Service, Mount Vernon, N. Y.

A SHORT time ago the writer made a traffic survey of an eastern city with the view of determining wherein the transportation facilities of the community could be improved. He had been asked, particularly, to go into the details of the street railway service and of the competing jitney-bus service, which were on a dog-eat-dog basis, with the overtaxed railway getting the worst of it.

On analyzing this community on a block-to-block basis, it was evident that the directions of its growth had been influenced more by its electric railway facilities than by any other factor. The better-grade suburban development consisted of two shoe-strings which extended along the rails to 2 miles beyond the city limits. In the angle formed by these diverging trolley routes, and beginning at a point within a mile of the city center, was a great area of splendid but almost vacant high-ground territory. Nor was this territory difficult to reach or traverse. It was bifurcated by a brand-new Warrenite highway, and almost all the intersecting streets were also covered with barely-touched asphalt.

Why had this area, so close to the city center and so thoroughly improved, been neglected in favor of territory beyond the city limits? For the simple reason that it had no trolley transportation. No one was holding the land for a rise. Indeed, one realtor more optimistic than truthful placed on his "For Sale" sign this significant legend: "Trolley cars will pass by here shortly."

Another part of the same city was rapidly changing from a foreign colony to a purely manufacturing district. Part of the colony had been extruded to an isolated section beyond the city line, but intercourse between the friends in the old and the new settlements was extremely difficult. There was no direct transit between the two areas except by a 2-mile walk or so up-hill and down dale. It was also unfortunate that there was no direct car service between the city center and the greater part of these two settlements. The foreigners in them were "cabined, cribbed, confined" to their own kind with little temptation to mingle with the larger life of the city.

Why There Were No Electric Railways

One naturally asks the question: Why did the local trolley company fail to keep pace with the growth of the community? The answers are several, but the most important are that the company's revenues had not increased fast enough under war conditions to sustain its credit and that the city had permitted the jitney bus to work how, when and where it pleased. The result was that with these leeches at work on what had been profitable, short-haul routes, the trolley had become so anemic that it had barely enough strength to carry on its original services. New routes rarely pay in the beginning, and they never pay at all if unfair competition arrives just as soon as a decent density is worked up through the pioneering of the railway.

Thus has come about the lop-sided suburban development of this community. It has spent millions for the opening up of healthful home-building areas, only to see its workers string out into other townships along trolley routes that had been built to tie neighboring communities together. This sort of thing was not good for the railway, because it increased the length of ride beyond the economic limit, and it was not good for the patrons, because it made them spend twice and even three times as much time on the cars as would have been necessary with more intratown transit available.

So, too, the electric railway can hardly be blamed for failing to build a connection

between the two foreign settlements. In a few years more the older settlement will have been crowded out by the factories, whereupon the tides of travel will shift in entirely different and partly unforeseeable directions. Why should the company, therefore, build a route that would be a sure loss?

Why Doesn't the Jitney Bus Help Out?

Here someone may say: "Well, why can't the jitney bus take care of these trackless streets instead of running over the same congested highways as the street car?" Aye, there's the rub. Development of traffic is no part of a jitneur's life, except such traffic as is created by his greater frequency of service. In this city, for example, jitneurs swarm on streets where street railway travel was densest and rides were shortest in the old days. Now and then an adventurous soul tries the less-traveled trolley routes, but in two or three days he is back at the old stand in spite of the fact that his fellow-jitneurs may have staked him to free gasoline!

This condition illustrates the viciousness of jitney competition. It does not take advantage of the ability of the motor-bus to go anywhere. Yet it is this very quality of the motor-bus that is its one best claim to be a factor in city transportation. When the motor-bus merely follows in the groove cut by the street car, it adds to the congestion and slowing-down of traffic instead of relieving and speeding up traffic. The latter it can do only when it operates on streets different from those occupied by the trolley. But there is no money in traffic relief work so far as the independent bus operator is concerned.

Motor-Bus Operation by the Street Railway Itself Offers the Solution

Since the jitney-bus operator will not use his vehicle to develop new sections or to connect isolated districts having something in common, let us see if we cannot reasonably ask the electric railway to accept this task. In the old days we expected the electric railway to take the lean with the fat as a matter of course. Now that the fat has been fried out, we must approach this matter from a new angle. First of all, we must remember that it costs a great deal more to put down electric railway track than in the days of cheap steel rails and dirt or cobblestone roads; secondly, we have learned that changes in community life can turn a heavily-traveled trackway into a streak of rust; thirdly, no electric railway is hankering to take on any more paving

ONE TYPE OF PASSENGER MOTOR BUS USED TO HELP THE TRAFFIC PROBLEM

burdens, franchise taxes and the like when motor-busses pay little more than license fees and nothing at all for breaking up paving.

But, fourthly, and most important, do we really want the electric railway to put down track in high-grade residential streets or anywhere else where maximum carrying capacity is not required? Should we not look upon every street as a potential busway and ask the local transportation system to treat its problems accordingly?

And, above all, we cannot expect the electric railway to show any enthusiasm unless it is assured that it will have a monopoly of all the popular-priced transit in the community, whether on rails or rubber. There can be no half-way house of jitney competition between the present monopoly by a privately-owned railway and the possible future monopoly by a publicly-owned railway. Every dollar that electric railways will spend to-day must be a protected dollar.

It is only through the coördination of street car and motor-bus service under one management that we can expect to get the most transportation for the least cost. We have seen that the one-man automatic safety car* enables the electric railway to give so good a service that there is little opportunity for jitney competition; but this fact does not absolve an electric railway from giving some kind of service where conditions do not permit the expense, or where it is undesirable to extend the trackway. It is therefore incumbent upon the electric railway to use the motor-bus for such service exactly as has been done by the British tramways for more than a decade past.

Auxiliary Benefits to the Electric Railway and the Public Cannot Prevent a Higher Fare for Bus Service

The jitney-bus operator in spite of all sorts of favoritism has not found the development of business outside of the best trackways to be worth while. We can hardly imagine, therefore, that an electric railway running a bus department and subject to the obligation of giving service rain or shine would find the bus business self-sustaining; and this is all the more likely because one of the thankless features of bus operation is that it is most valuable where the traffic is too thin to make any kind of transportation medium pay. But if the electric railway cannot make the bus a self-sustaining proposition, it can secure certain advantages not open to the independent motor-bus operator. Thus it can put off the construction of costly track extensions; give bus service on streets parallel to congested trackways, thus recouping itself for bus losses through the attainment of higher schedule speeds on the car routes; develop a short-cut service between factories and the principal residential districts, to avoid transferring large masses of rush-hour riders at but one or two overworked downtown intersections; and enjoy the use of a mobile corps of vehicles that can be employed to help out various routes or meet emergency traffic conditions (as during fires) far better than cars confined to rails.

Nevertheless, it must not be assumed that, even with these things in its favor, an electric railway can afford to conduct a bus service as cheaply as a street railway service which is dense enough, let us say, to call for a 5-minute or 7½-minute service. It can be put down as an absolute fact that the cost of a seat-mile on a bus is from 1½ to 2 times as great as for up-to-date street car operation on any but the most waterlogged systems. This factor has been found just as true by the writer, in studying American conditions, as by British engineers, in studying their own street-car and motor-bus services. It therefore follows that even a partially-subsidized motor-bus service must be conducted at a higher rate of fare than the local street-car service. Thus, the Sheffield (England) Tramways in 1918 charged its car riders an average of 1.3 cents per mile, and its motor-bus riders an average of 3 cents per mile, due in part to the higher cost of bus service and in part to the fact that such bus service was conducted chiefly on thin-traffic extensions.

What Coördination of Bus and Car Will Mean for Better City Planning

From what has been said, it is obvious that the motor-bus opens entirely new vistas in civic development, because every street is a potential travelway available immediately without the trouble of breaking up paving, securing consents from property owners, or going into litigation because of

* See THE AMERICAN CITY for January, 1920: "Modern Car Service at Moderate Fares."

special privileges. The motor-bus uses the common highway and takes the same chance as any other vehicle in its goings and comings, instead of calling for a special structure with an implied right-of-way. With the motor-bus operated as a part of the street railway system, it will not be necessary to girdle civic centers with rails and a network of wires; nor will it be necessary for the city to have its growth circumscribed by straitjacketing to a few lines of rails when every street is a possible travel way. New areas can be opened up and be given service in direct proportion to their needs, whether transitory or permanent, without demanding a heavy fixed investment for track, power and overhead line regardless of the amount of travel. In short, those who desire more esthetic street conditions or transportation fitted to small but pressing or special needs can have it in the motor-bus at a cost bearing a fair proportion to the greater expense of giving such service. But those who still believe that the motor-bus of to-day can replace economically or spatially the street car on business thoroughfares or other heavy-traffic routes, are cherishing a vain hope. The jitney can break a street railway, but it cannot duplicate its service and meet its responsibilities as a taxpayer at anywhere near the same price.

Street Lighting in Chicago

A Summary of the Organization Methods of Electric and Gas Street Lighting in the Metropolis of the Middle West

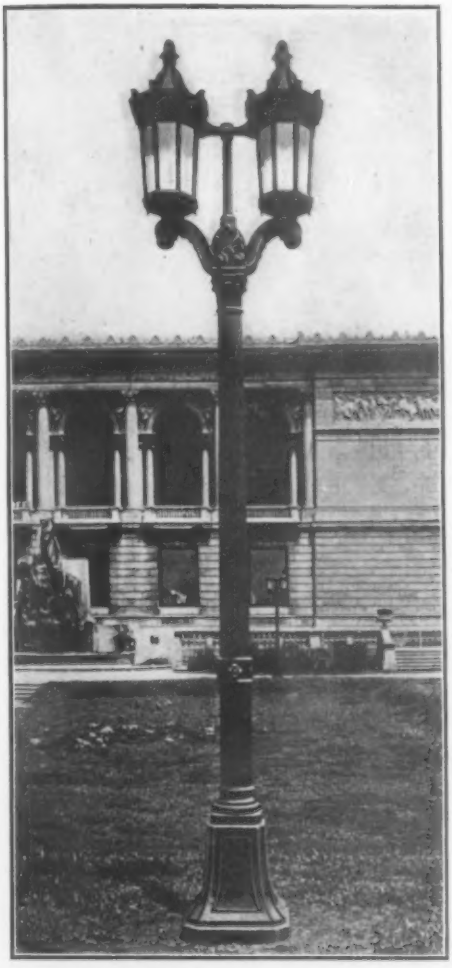
THE personnel of the Division of Electric Street Lamp Operation in Chicago is composed of a foreman of electric lamps, an assistant foreman, patrolmen, cleaners and repairmen. The patrolmen are assigned to routes or districts to make a nightly inspection of all lamps and to see that the lamps are in operation and that all globes are intact. In the event that a lamp is not operating or the globe is broken, the patrolman renews the lamp or globe at once, provided the fixture is suspended on an automatic cut-out hanger or operating on a low-potential circuit. If the fixture is operating on a high-potential circuit, without an automatic cut-out hanger, renewals are made the next day, after the circuit is shut down.

The cleaners are assigned to districts to clean lamps, globes and reflectors, the district being so arranged that the equipment will be cleaned at certain definite intervals of time, depending on the location of the district. The repairmen make all repairs to lamp fixtures which can be made in the field, and replace broken globes on fixtures suspended from fixed hangers.

One patrolman with an automobile patrols and renews all lamps in a district covering 1,500 600-candle-power, or 2,250 100-candle-power lamps. A patrolman on foot covers a district of 500 600-candle-power or 750 100-candle-power lamps, and a cleaner takes care of approximately 50 locations per day.

The bureau receives regular reports from the patrolmen, circuit repairers and load dispatchers. The patrolmen's reports give the location and time of all lamp outages, and renewals of lamps and globes. The circuit repairers' reports contain a record of all cases of trouble in any part of the secondary, or 5,000-volt, distribution system, such as the aerial and underground cable, the fixtures and the sockets. The load dispatchers' reports are a record of transmission or distribution failures, giving the time of the failure and the circuits affected, also the time when service is restored on the circuit.

The information contained in these various reports is carefully compiled and tabulated, and a monthly report is made showing the over-all efficiency of the lighting system for the month. These reports also reveal the weak spots in the lighting system, inasmuch as the cases of trouble are tabulated under different headings of causes, and in this way improvements are continuously being made in the system. The reports show that a large percentage of lamp outages have been due to failures in the automatic cut-out hangers. Accordingly, provision is being made to do away with the automatic cut-out hangers, which will result in a great reduction in lamp outages.



TWO-LIGHT ELECTRIC POST USED IN GRANT PARK, CHICAGO

According to the Twenty-Second Annual Report of the Department of Gas and Electricity, the efficiency of the street-lighting operation was maintained at about 99.5 per cent from April 1 to December 31, 1918. During the year 1918, there were added to the system 11,528 new lights, so that the total number of lights in service at the end of the year was 55,534, compared with 34,076 at the end of 1917, or an increase of 34 per cent. By the end of the year, all arc lamps had been replaced by incandescent lamps.

The Distribution System

The Sanitary District of Chicago has been selling to the city all energy used for the system at the rate of $15 per horsepower per year. On October 28, 1918, a new contract went into effect whereby the city now pays for energy at the rate of $15 per kilowatt per year, a decrease in cost of 25.4 per cent. The cost of power for 1918 was 0.44 cents per kilowatt hour. The number of kilowatts to be paid for is based on maximum half-hour consumption for each month in each station, as determined by printometer tapes. The wattmeters for measuring the power are connected in such a way as to measure the input to each bank of transformers. The electrical energy is produced in the hydroelectric plant at the terminus of the Chicago Drainage Canal at Lockport, Ill.

Three 44,000-volt transmission lines on steel towers bring the energy to the Sanitary District distributing station, where it is reduced to 12,000 volts for distribution to the various city substations through underground cables owned by the city. The substations in which these 12,000-volt lines terminate, and from which series street-lighting circuits originate, are owned and operated by the city.

The energy is transformed in the substations from 12,000 volts to 5,950, 3,650 and 4,250 volts. The single-phase, 250-K. V. A. transformers are used for this purpose. The energy is distributed as single-phase current to the various series street-lighting circuits. Each circuit is operated through a constant-current induction regulator, which under normal operating conditions has 1,600 volts across its terminals. All street-lighting circuits leave the substations in multiconductor cables placed in municipally owned conduit lines, breaking up into single-conductor cables for feeding underground circuits, or through pothead cable poles for feeding aerial circuits.

Lighting Standards and Lamps

The poles used to support lamps on all types of circuits have been standardized and are illustrated herewith. One hundred and sixty-five feet has been adopted as the maximum distance between poles for No. 6 W. P. wire. Malleable cast-iron brackets and cross-arms are used exclusively on recently installed work.

The standards of the Department of Gas and Electricity call for the operation of

an arc lamp or its equivalent at every street intersection and at every intersection of a street with an alley, and sufficient additional lamps, so that no length of street greater than 350 feet will be without a lamp. In the business district this distance is reduced to 250 feet. Lamps on underground circuits are staggered on the two sides of the street, while the aerial circuits are installed on one side only.

In addition to the lights mentioned above, the department operates a large number of 75-watt, 100 candle-power nitrogen tungsten lamps. A submarine cable is laid in the parkway, and posts formerly used to support gas lamps are used to carry the lamp equipment, including a film cut-out. Seventy-five of these lamps are installed per mile of street, two being placed at each street intersection, one at each intersection of a street and an alley, and, in general, one lamp for each 75 lineal feet of street.

The standard for all future installations of 100-candle-power lights is an amplification of the system mentioned above. Cables are all laid in the parkway, 5,000-volt cable being used for the primary circuit, and 600-volt cable for the secondary circuit. For street and alley crossings the cable is protected by fibre conduit encased in concrete, or steel pipe which is pushed from curb to curb without disturbing the existing paving. There are 250 to 350 100-candle-power, 6.6-ampere Mazda "C" series lamps, with 110-volt film cut-out on each circuit. These lamps are operated in groups of 17 to 31 lamps for each group. Each group is connected to the secondary side of a series transformer, which operates at 6.6-ampere primary with a ratio of 1 to 1. There are usually twelve of these transformers, with their primary windings connected in series on each 5,000-volt circuit. The secondary windings of the transformers are grounded at the middle point, so that the maximum voltage from the secondary circuit to ground is cut in half, thus greatly reducing the hazard to persons coming in contact with damaged equipment. There are two sizes of transformers used for the group-lighting circuits, one for circuits of less than 23 lamps, and one for circuits of 23 to 31 lamps.

The transformers are installed in manholes usually located at the center of three or four groups, thus reducing to a minimum the number of manholes and the amount of cable required.

A new and artistic post mounted in a concrete foundation is used on all installations of these lamps. The 100-candle-power lamp is enclosed in a 14-inch spherical diffusing globe placed at the top of the post, and is about 10 feet 6 inches above the ground. There are a considerable number of street lamps rented from the Public Utilities Company by the city for street-lighting purposes in parts where there are

THE ELECTRIC GLOBES ON THIS CHICAGO STREET WERE SECURED TO FIT THE POLES FORMERLY USED FOR GAS STREET LIGHTS

no facilities for operating lamps on the municipal system.

Gas and Gasoline Lighting

The department contracts for the operation and maintenance of several thousand gas and gasoline lamps in those parts of the city where electric-lighting facilities are not available. In such outlying districts, gas lamps, 65 to a mile of street, are operated. The last are the inverted-mantle type, guaranteed to produce 50-candle-power illumination and to consume not more than 3 cubic feet of gas per hour.

	Gas Standard	Gas Ornamental	Gas Double Mantle Ornamental	Gasoline	Total
Average number of lamps	5,856	1,251	56	4,907	12,070
Operation by contract	$81,809.06	$18,803.67	$850.77	$214,767.56	$316,231.06
Gas	34,316.99	7,328.78	656.41	.....	42,302.18
Administration and engineering	3,721.36	794.98	35.59	3,118.29	7,670.22
Total cash cost	$119,847.41	$26,927.43	$1,542.77	$217,885.85	$366,203.46
Cash cost per lamp	$20.47	$21.52	$27.55	$44.40	

A small number of an ornamental type of lamps of the same rate of gas consumption and 49-candle-power guaranteed illumination are used. One hundred and eighty-eight double gas lamps have been installed on Sheridan Road. These produce 8-candle-power illumination and consume 6 cubic feet of gas per hour. The gas lamp posts are the property of the city, and the lamps are the property of the contractor.

Some gasoline lamps are used to supply temporary light needs on streets where it is not possible or practicable to install electric or gas lamps. These lamps are guaranteed to produce 50-candle-power illumination. Both posts and lamps are the property of the contractor. The gas and gasoline lamps are operated upon a schedule which aggregates a total of 3,786 hours per year.

Service is supervised by tests and periodical inspection of the lamps. Inspection of 25 per cent of all the lamps of each type is made each month, and the result is multiplied by four on the assumption that the condition of the inspected district is typical of the whole city. Deduction is then made from the contractor's monthly bill.

A small construction force is maintained by the city for the delivery, installation, occasional moving, and the removal of gas lamp posts when they have been displaced by electric lighting.

The following table shows the cash cost of gas and gasoline lighting for the year 1918:

Electrolysis Investigation

Electrolysis investigations in the interests of the subsurface structures of the city are performed by an investigator in the employ of the Bureau of Water Pipe Extension, under the supervision of the Department of Gas and Electricity. This work consists in the investigation of electrolytic conditions in all locations where it is believed damage from stray street railway return currents is occurring in city water-mains or lead sheaths of the city's street-lighting transmission cables or the city's fire alarm and police telephone cables.

At locations where other utilities have underground equipment and are consequently interested in the electrolytic conditions, such investigations are usually carried on in coöperation with the other companies concerned. Considerable progress has been made in reducing the feeding distances by the installation of new substations. This is important, inasmuch as it is in itself a mitigation measure.

The success of a public service utility finally resolves itself into a matter of intelligent management, for, unlike many lines of private business, its patronage is permanently assured. If, in some cases, or in many, the public does not know how to conduct business, it must, like a private individual, or a corporation, learn how. The many successful public service utilities now owned and operated by communities throughout the country indicate clearly that the people of the United States are learning how.

Publicity as a Means of Promoting Efficiency in Health Work

By B. L. Carlton, M. D.
Health Officer, Winston-Salem, N. C.

HEALTH education is not an institution of long standing in this country. It is taking us a long time to realize that health is the one great asset of a nation, and should be seriously considered. That it is being considered, nation-wide, is amply proved by the campaign against tuberculosis and by the child-welfare campaign. These movements have demonstrated that curing is too slow a method of combating the evils and that better results can be obtained by intelligent care and by controlling predisposing factors—in other words, by prevention.

The kind of work which a health department can do will be that which a majority of the people wishes to have done; therefore it is incumbent upon the department to so mould the feelings and knowledge of the individuals of the community that they will give their active support to the health administration.

People get their ideas of sanitation and hygiene from various sources: from tradition, which is more often inaccurate than correct; from physicians, who too often are easy-going and do not really see that their patients get the correct viewpoint as regards personal hygiene or proper ideas of prevention; from newspapers, which should be one of the most active sources of health propaganda, but which so frequently carry patent medicine advertisements and great headline news articles concerning some drugless quack healer, nearly to the exclusion of statements of local or state departments of health; from the public schools, which are becoming more and more sources of knowledge of public health matters; and, finally, from the activities of the health department, which as a source of knowledge of public health matters, to a certain extent includes all the others mentioned. Every health officer should be a teacher, and every health department should be a school of instruction setting forth the fundamental principles upon which public health activities are based, and making clear, in language as simple as the language of the street, if necessary, just what guarding one's health means, just how it is done, and what the department proposes to do to help the individual and the community to secure and apply those things necessary to prevent disease and to further the cause of good health. Such instruction has as its objective, legislation, the necessary funds, public coöperation, and effective carrying out of the sanitary regulations.

Means of Publicity

The means at our command for such publicity or educational propaganda are legion. The newspapers constitute one of the most important means that should be used freely and sensibly. A health officer is fortunate when he can make a personal, confidential friend of the editor or a reporter for one or more of the leading newspapers of his town. The papers will generally handle willingly all items of interest coming from the department if written simply, without technical terms. Only items of interest should be handed out—and this does not mean that some of the activities of the department or that some of the items of public health matters should be purposely covered up, but that all items, even those of statistics and regular reports, should be so arranged that they will make an appeal to the public interest; that the public may be taken into the confidence of the department. Statements should be truthful and accurate and of value to the public—never should the department of health reach the point when it considers its duty to be to issue a continuous stream of bulletins, press notices, etc. Under such circumstances sooner or later untrustworthy advice or information will be given publicity. We do not have to go back very many months in our memory to recall just such circumstances, when many of the health workers of this country were issuing instructions by the yard as to means of con-

trolling influenza—which instruction in the final analysis frequently did not bear fruit to the credit of the department.

Handbills and special bulletins may be often used to advantage if some object is to be presented to large numbers of persons quickly. For instance, as a means of announcing the opening of a clinic for tuberculosis, or a baby health station, circulars setting forth such an item could be distributed through the schools by nurses, by sanitary inspectors or by mail. Reprints of extracts from the annual report are of value, especially if setting forth some particular feature, such as the rating of dairies furnishing the milk supply, or the rating of food-handling places, or mentioning some especial need, as additional public health nurses or additional clinics. Lectures, health exhibits, motion pictures portraying health subjects, are all of educational value by being a means of instruction to those in attendance and also by calling attention to the activities of the local board.

Another means of publicity is the campaign for some special object. The anti-tuberculosis campaigns of education have been one of the chief means of progress in public health work in the United States. The effects of such a campaign are always felt in all other lines of public health work.

Not only are newspapers, handbills, posters, bulletins, lectures, motion pictures, special campaigns, means of publicity and education, but the hundred and one little things daily coming up in the department of health are to be used with the objective of publicity and education in mind. Every complaint received affords an opportunity to explain the sanitary principles involved; every case of contagious disease is a center for educating the family and neighbors; every case of contagious disease in school affords an opportunity of explaining to parents and children (our greatest asset) the methods of handling contagious disease; every daily inspection of school children is a means, and a valuable one, of publicity for the department and education for the child.

Special Publicity Work in Winston-Salem

One or two items now in use in the department in Winston-Salem may be of interest. The first is our practice of sending a circular letter of definite instructions to parents of children having contagious diseases, especially measles, diphtheria and whooping cough—and calling their especial attention to the dangers that might follow, warning particularly of tuberculosis. Another custom is that of a monthly department letter to our dairymen.

Another thing we have been doing since January 1 which is a particularly good stroke of publicity is mailing to parents of every child born a certificate of registration of that child's birth, accompanied by a letter of congratulations and a baby record book. We are getting a most wholesome response to this activity on our part: the mother is pleased that we send her baby a book and a certificate of registration bearing the gold seal of the city and a blue ribbon, and we are pleased that we are assured of her further coöperation.

Does Publicity Pay?

Does publicity as a means of efficiency pay? We think most certainly it does, and we believe the activities of our own humble department of health bear this out.

Active, persistent setting forth of the needs of the department and of how we would proceed if given the right kind of coöperation was maintained. The newspapers helped, literature from our state department and from the U. S. Public Health Service was used, motion pictures pertaining to venereal diseases were shown, slides illustrating baby clinics were shown, leaflets entitled "Save the Babies" gave a few plain, unvarnished facts; leaflets entitled "Tuberculosis in Winston-Salem" did likewise; the health officer at opportune times appeared before local organizations, including the Board of Trade, with a few facts and suggestions. The result: legislation, funds and coöperation sufficient to provide seven nurses instead of two, two baby health stations, a central milk pasturization plant, a venereal disease clinic, a tuberculosis clinic, a dental clinic for school children, a full-time medical inspector for schools, and other items in the same proportion.

Our conclusion is, that without sensible health education the health department can accomplish very little toward eradicating disease.

ACKNOWLEDGMENT.—From a paper read at the annual meeting of the North Carolina Health Officers Association.

Justice to Both Minority and Majority Through Proportional Representation in City Elections

By J. L. Conger, Ph. D.
Department of History, Knox College, Galesburg, Ill.

EVERY careful observer and student of municipal affairs in Illinois to-day, and, in fact, in the Middle West, is voicing an insistent demand for a greater degree of home rule: that is, freedom for cities; first, in the making of their charters; secondly, a larger degree of freedom in the matter of fiscal affairs; and, thirdly, a wider local control of public utilities. To us all this appeals as perfectly natural and legitimate. There is, however, one fear rather widespread in America to-day that is blocking this more or less legitimate movement for home rule on the part of our cities; that is a fear that home rule really means a greater capacity for viciousness or ridiculous activity by the city hall crowd. This feeling is shared not only by state legislatures and constitutional conventions, but by the most worth-while citizens of our cities.

This is a day of reforms. Everywhere there is an awakened interest in the short ballot, in non-partisan elections, in budget legislation, business management for cities, and the commission-manager form of municipal government. All these are good, but many citizens feel an imperative need for a more fundamental change. Some scheme must be evolved for increasing the confidence of all classes of citizens in the particular administration that may be operating in the city hall. When this is done, of course a second goal has been reached, for this will guarantee the appearance of a better grade of citizens in the official life of municipalities.

Representing the Majority

Many parts of the world, including much of Western Europe, have found for a generation or more that a remedy for similar abnormal conditions lies in proportional representation, or the single transferable ballot. This has worked for simplicity in election, for economy, and as a means of guaranteeing the interest, sympathy and confidence of the great majority rather than a minority of the citizens in the work of their elected administration. Moreover, it has broken down the power of a well-organized minority, demonstrated the use-

THE COUNT OF THE FIRST PROPORTIONAL REPRESENTATION ELECTION IN AMERICA, AT ASHTABULA, OHIO, IN NOVEMBER, 1915

lessness of the "boss," cured practically all the evils incidental to our direct primary, and has worked for a much larger degree of coöperation, mutual consideration and confidence than we find in municipal life.

Under this system as applied to American city life, the viciousness of the old ward line influence would be wiped out, more than half of our growing burden of election expenses would disappear, the "boss" would be transformed from a vicious manipulator of the most undesirable class of voters working in the dark to a political specialist or leader making his appeal to the intelligence rather than to the appetites, working entirely in the open and altogether legitimate in function. The plan is not by any manner of means Utopian, for it has had a very respectable experience. The experience of Ashtabula, Ohio, and Kalamazoo, Mich.,* under proportional representation charters is most enviable and stimulating. In most of our cities the city administration is fortunate if it has behind it 35 to 40 per cent of the population, whereas in Kalamazoo more than 95 per cent of the voters could feel that they had actual personal representation on the city commission. To those of us who try to see in the city manager the ideal form of city administration none can fail to see that the fundamental weakness in the Dayton scheme as at present constituted is the non-representative character of the commission, which must stand between the city manager and the public opinion.

On the basis of our old majority-minority plan of electing city councils it is inevitable that a minority, if not an actual majority, of the voters shall be opposed to the city commission and the city manager. On the basis of exact justice, proportional representation offers the only method of giving to minorities their due weight in the affairs of the city, at the same time doing no injustice to the majority. Let no one suppose that this system would deny the right of an actual majority in the city council to make decisions. But the value lies in the fact that all the considerable factions of the city would have their self-selected, instead of hand-picked, representatives at the council table, there to speak for their own folks, to deliberate with equally honest men, and, after the council had determined upon a policy, to interpret the action of the council back to their own constituents.

No one can doubt that a council made up, as all proportional representation councils must be, of representatives of all the aggressive lines of thought in a city deliberating seriously, earnestly and intelligently upon any vital action, would come finally to a practically unanimous decision. When this was accomplished there would be strong likelihood of universal acceptance of their dictum, a situation now impossible, no matter how unanimous our present-time council may be. In fact, the more unanimous an old-time city council is, the more sure are certain large elements of our life to be suspicious of a political "deal."

Proportional representation offers no miracle and no panacea. All it professes to do is to condense the life and thought of a municipality into a small group of seven, nine, eleven or more men who will be simply a faithful epitome or reflection of the larger group of citizens. Such a city council will be no worse and no better than the citizenship of the community, and this is all we can ask. But with the ease of nomination by small petition and the fact that political alignments are determined by similarity of thought rather than geographical location of a man's dormitory, it becomes evident that any set of men similarly minded cannot only easily nominate one of their kind, but if they and their fellows constitute a considerable fraction of the voters of the municipality they are sure to elect their most popular spokesman —and they are sure of doing this, even though their votes at first may be scattered among several such candidates. Thus it is seen that the principal incentive in party regularity of the partisan whip or boss is removed.

To-day we are held into unnatural alliances by the hope of half a loaf instead of a whole loaf, or by the fear that a divided following spells defeat and the elevation of an opposing candidate. All of this is removed by the Hare system of voting.

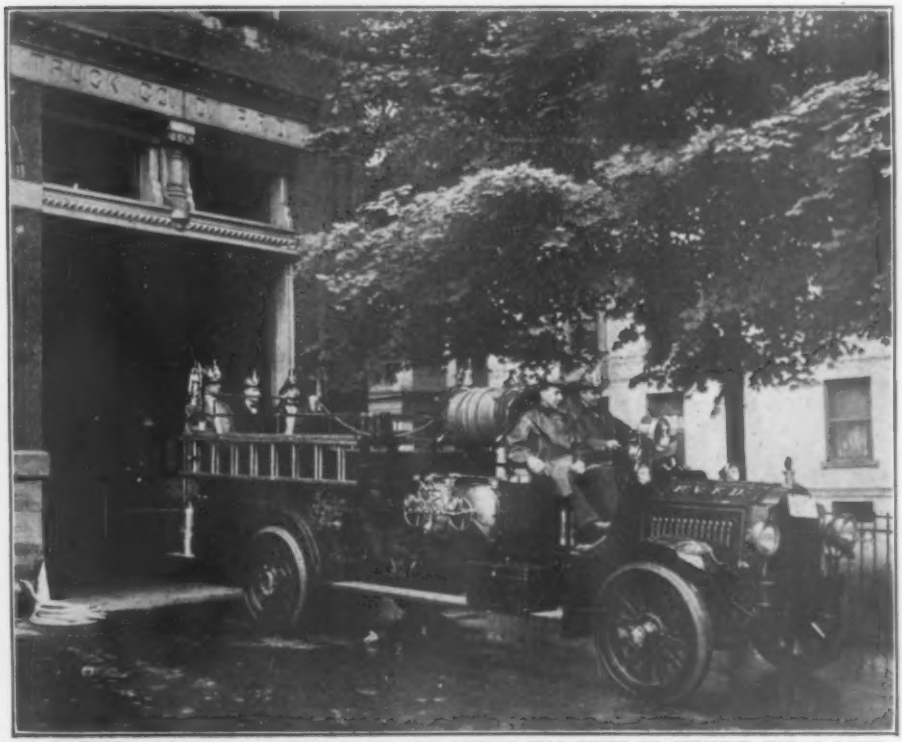
* During the fall of 1919 the Kalamazoo commission-manager charter, with its proportional representation provisions, was attacked by a former city official who had been dispossessed of his office by the new system, on the ground that the method of election was unconstitutional in that the voters were denied the right of casting their votes for all the elected city officials. This contention was upheld in a rather weak opinion by the lower court. The case has been appealed, but has not been argued on appeal as yet.

The Motor Truck Finds Its Place in Promoting Safety and Sanitation

THE DEPARTMENT OF STREETS, NEW ROCHELLE, N. Y., USES THIS AUTOCAR TO HAUL RUBBISH TO THE CITY DUMP

MOTOR STREET FLUSHER USED BY THE CITY OF ALBANY, N. Y.

A HEAVY HOOK AND LADDER TRUCK MADE BY THE AMERICAN-LA FRANCE FIRE ENGINE COMPANY, IN SERVICE IN BLOOMINGTON, ILL.



A PACKARD HOSE AND CHEMICAL WAGON WHICH HAS BEEN IN SERVICE FOR A LONG PERIOD AT PARNASSUS, PA.

A Dual-Purpose Rest Room

By Sara Maynard Clark

THE merchants of Mason City, Iowa, have solved the problem of a rest room to the complete satisfaction of themselves and those who are the most extensive users of such a room, the farmer and his wife. Mason City is a live town of about 20,000 population with a group of merchants who accomplish gratifying results through their Retail Merchants' Association. For some time they had coöperated with the club women of Mason City in the operation of a rest room, paying most of the expenses of the room, while the women of the various clubs supervised it. This plan was found to be costing the merchants about $150 a month. With the general rise in rents, food (for lunches were served), and matron's salary, the expenses of the rest room rapidly jumped beyond reasonable maintenance cost. So it was discontinued.

After a few months the need of a centrally located rest room became apparent. Women of the farms object to trading in a town where they must walk about the streets or stand long and tiresome hours in a store waiting to start home.

Charles H. Barber, Secretary of the Retail Merchants' Association, was the originator of the present successful plan. As the Association offices were on a side street, from one to three or four blocks out of the way for most of the merchants, Mr. Barber figured that if a suitable room could be found in a central location, a rest room and office room might be combined.

In Cerro Gordo County are twenty-three rural clubs bound together in a strong county federation. Mr. Barber approached the president of the Federated Country Clubs in regard to their coöperation with the merchants in establishing such a room, with the result that through the federation the country clubs gave suitable furniture for the room which the merchants rented.

The Community Rest Room, as it is called, is a large, light, comfortable room in the basement of the First National Bank Building, a central location at the corner of Federal Avenue and State Street. An outside stairway and elevators inside the building provide easy access to the room. Little expense was necessary to remodel the room for the purpose for which it is used. At one end a cozy nook was curtained off and furnished with a table, rocking chairs and a cot for the use of mothers and little children. In the main part of the room is a long library table covered with reading matter. Magazines are furnished by a few individuals and the librarian of the public library. Chairs are scattered about the room and grouped conveniently around the reading table. Adequate toilet rooms adjoin. At one side a space is railed off for the offices of the Retail Merchants' Association. Mr. Barber's and his assistant's

SIGNS LIKE THIS ARE PLACED ON ALL ROADS IN THE OUTSKIRTS OF MASON CITY, IA.

desks are placed here, and the constant presence of these officials eliminates the necessity of a caretaker. Large signs are placed at the edge of the city on all main roads, directing the stranger to the rest room.

The yearly maintenance cost of the Community Rest Room averages about $1,100, covering rent, heat and janitor service.

The country people feel a desirable partnership in the room, for they furnished it and take a personal interest in its welfare. It also affords a headquarters for meetings of the advisory board of the Federated Country Clubs of Cerro Gordo County as well as the various committees of the federation. Here is hung the county service flag with seventy-eight stars, three of gold.

News and Ideas for Commercial and Civic Organizations

New Brunswick Plans to Become a Seaport

NEW BRUNSWICK, N. J.—The old college town of New Brunswick, twelve miles from lower New York Bay, is ambitious to become a seaport, and the New Brunswick Board of Trade is responsible for a movement that may ultimately bring this about. It is an interesting story and shows what may be done by coöperation. True, the plan is only in its infancy, but it has been well thought out and is practicable, and there is therefore hope of its achievement. The city also hopes that when it becomes a seaport it may be a transfer station for the exchange of express matter from ocean liners to aeroplanes for delivery to distant cities.

In developing the commerce of the city, the Board of Trade has taken up the improvement of the Raritan River, which at present has a depth of only 10 feet. A joint committee of the Board of Trade and the City Commissioners worked out a plan for a municipal dock which will insure federal aid to deepen the channel of the river. The outgrowth of this committee's deliberations is the Raritan Terminal and Waterways Association, representing the governing and civic bodies of nine municipalities and having an affiliated membership of more than 1,200.

The active members of the chambers of commerce of the various municipalities are interested in this movement for deeper water, and coöperated with the Raritan Terminal and Waterways Association in its efforts to have incorporated into the Rivers and Harbors bill a provision for a survey and examination of the Raritan River, with a view to obtaining a deeper channel to New Brunswick, 15 feet to begin with, and ultimately 20 or 25 feet, to enable big boats to come up the river. It is expected also that at least two of the bad turns in the lower part of the river will be straightened.

The River and Harbor bill was passed last month in the closing hours of the session of Congress. This means that the survey of the Raritan River, for which the bill made provision, will be conducted. The details of the survey now rest with Colonel Sanford, the new District Engineer, whose headquarters are in New York City. Data regarding the present and prospective traffic in the Raritan River will be submitted to him by the officers of the Raritan Terminal and Waterways Association, and it is expected that the principal officers of the Association will have a conference with Colonel Sanford soon in order that he may be apprised of their interest and of the great need for deeper water to meet the requirements of commerce.

Raritan Bay is so close to New York Harbor that the establishment of a seaport at New Brunswick will greatly relieve the congestion at New York and is bound to afford means of handling shipping to much better advantage. Raritan Bay empties into lower New York Bay, where the channels are more than 21 feet deep. Above the city of Perth Amboy there is plenty of land available on both sides of the river for warehouses and landing fields that could be utilized for the storage of freight pending shipment abroad or to South America.

CONDIT S. ATKINSON,
Secretary, New Brunswick Board of Trade.

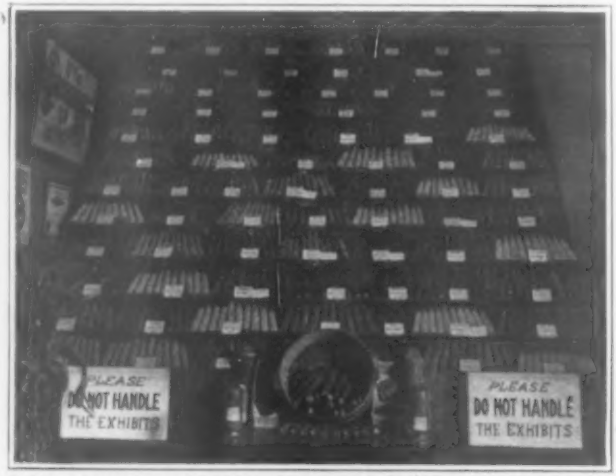
Products Shows Unite City and Country People

MINOT, N. DAK.—The Minot Association of Commerce believes that one of the best ways in which to help the farmers is to inaugurate the holding of farm products shows during the winter months. During the last four years this Association has tried its hand at mid-winter fairs, summer live stock shows, poultry shows, and corn and potato shows, and all of them, with the exception of the summer live stock show, were especially effective in promoting closer relationship between the town and the rural business man. Particularly was this true

with the corn and potato show held last winter. The Secretary of this Association was able to meet many of the farmers in a social way and succeeded in blotting out somewhat the unwarranted suspicion that is the cause of so much hard feeling between town and country people.

The Secretary asked for the exhibits of corn to display in the offices of the Association of Commerce after the show was over. The accompanying picture indicates how well the exhibitors responded. This exhibit is the first thing that greets the caller upon entering the Association of Commerce rooms. Each exhibit of ten ears bears a label giving the name and address of the exhibitor and the variety of corn.

This kind of exhibit serves many purposes. The exhibitors bring their friends to the office to see "their" corn; visitors from out of town invariably see the exhibit and are impressed with the resources and possibilities of the region; prospective corn planters discover where they can buy home-grown seed; and the members of the organization become interested in and advocate diversified farming, the salvation of any farming community.



CORN EXHIBIT ON DISPLAY IN THE OFFICE OF THE MINOT, N. DAK., ASSOCIATION OF COMMERCE

The Association of Commerce is working in perfect harmony with the County Farm Bureau, and there is no doubt that in a year or so it will have proved to the farmers that its efforts to promote agriculture are sincere, and that coöperation between town and country is not only feasible, but necessary. The Association recently organized a potato-growers' association, with the object of promoting the cultivation in this region of pure standardized seed potatoes, free from disease.

All winter product shows should be accompanied with music and social features, and wherever possible, lectures upon the various products shown. The farmers are interested in lectures if they are presented in the proper atmosphere. Last winter the corn and potato growers heard lectures in the same room where the exhibits were housed. That corn and potato show was christened the "Million-Dollar Show," because the yield of those two products this year is expected to be increased that much.

In advocating winter product exhibitions, the Association of Commerce feels that county, district and state fairs are not necessarily to be discouraged, but the product shows bring the commercial organization into closer contact with the farmer than the more pretentious fairs or exhibitions, and at a time of the year when he has leisure and needs entertainment. During the summer months he is so busy producing that he has no time for either exhibitions or entertainment.

WILL E. HOLBEIN,
Secretary, Minot Association of Commerce.

Massillon's Secretaries Meet Regularly

MASSILLON, OHIO.—Massillon has acquired the reputation of being one of the best-organized cities of its size in the country. This is unquestionably accounted for by the regular monthly conferences and special meetings of the Executive Secretaries Conference, which are held upon the call of the chairman. The Executive Secretaries Conference is an organization of all the paid secretaries in Massillon who devote their entire time to community work,

and includes the secretaries of the Chamber of Commerce, the Y. M. C. A., the Y. W. C. A., the Salvation Army, the Red Cross, the Boy Scouts, the Social Service League, and ex-officio the president of the Ministerial Association, the Woman's Club, the visiting nurse, and the Mayor of the city.

At these conferences matters of common interest are discussed and plans are laid to prevent duplication of effort. All money-raising campaigns are passed upon, and the dates for conducting them are arranged to meet the convenience of each unit. The Conference has developed a spirit of co-operation among the secretaries and has helped to coördinate all the community activities.

"What can the Conference do to assist your organization?" is the question that is asked at each conference. The best part of the plan is that it works.

EDWIN B. LORD,
Managing Secretary, Massillon Chamber of Commerce.

The Portland, Ind., Plan of Solving the Housing Problem

PORTLAND, IND.—One method of meeting and solving the omnipresent housing problem, and perhaps one of the simplest, has been evolved and successfully carried out by the Portland Commercial Association, with the result that the congestion in Portland has been materially relieved during the past year. This method, it is believed, will be of particular interest to cities of from 5,000 to 10,000 population, where low rentals make the construction of dwellings for tenancy at the present high prices of building material a poor investment.

Portland, like all other municipalities, large and small, throughout the country, early in the spring of 1919 keenly felt the need of more dwellings, and a housing committee appointed by the Commercial Association for six months sought a building plan which would be practicable in a county seat city of 6,000 inhabitants. As rentals were from $10 to $20 monthly, it was calculated that a dwelling costing from $2,500 to $3,000 would net the builder less than 4 per cent on his investment. Hence it was decided that building houses for tenancy at the present prices of material would be impractical from a business viewpoint. The committee therefore arrived at the conclusion that if houses were to be built, they would have to be built by public-spirited citizens who had the welfare and progress of the city at heart regardless of profit.

In July, 1919, a publicity campaign was launched to awaken the citizens to a realization of the fact that before the end of the year the industries would demand 300 more employes, which would mean that more houses must be built, because the living accommodations were at that time being taxed to their limit. By the middle of August public sentiment had crystallized into a definite demand for action. A citizens' mass meeting was called, which resulted in the adoption of the following plan.

Each industrial corporation, mercantile firm and individual in the city that was considered financially able to do so was called upon, through the Commercial Association's Housing Committee, to build from one to ten houses. A total of 54 houses was pledged. These new dwellings were to be for rent, and in case of any of them were sold when completed, the owner was to use the proceeds for the construction of another house at once. In other words, each individual and firm agreed to set aside a building fund of its own to be used for the construction of dwellings as long as the city needed additional housing facilities. These individual building funds amounted to about $100,000 in the aggregate.

Thirty-four of these houses are now completed. Nine of them have been sold and the proceeds are being used to build again. Out of the remaining 20 of the original number pledged, 17 will be finished this summer. The construction, type of house, location and the actual building details were left entirely to the owners, the only requirement being that the dwellings be finished within a year and that they comply with the city building code and sanitary regulations. The houses are of the bungalow type. They range in price from $2,400 to $3,000 and contain from four to seven rooms.

It is true that the building of these 54 houses will not entirely solve the city's housing problem, but independent private home building has been stimulated by this project in the meantime, and the situation is greatly improved.

KEITH SPADE,
Secretary-Manager, Portland Commercial Association.

EDITORIAL NOTE.—See the earlier achievement of Pontiac, Mich., along this line; THE AMERICAN CITY, Sept., 1919, p. 261.

THE BUILDING OCCUPIED BY THE MAGAZINE CLUB OF HASKELL, TEX., WHICH HAS BECOME THE CITY'S COMMUNITY CENTER

Haskell Magazine Club a Wide-awake Civic Institution

HASKELL, TEX.—The attractive building shown in the accompanying illustration is the recently acquired home of the Magazine Club of Haskell. This club was formed by the progressive women of Haskell eighteen years ago, before even a railroad passed through the town and when it was a tiny village surrounded by vast acres of pasture lands on which roamed Texas "Longhorns." Haskell is now a thriving little city of 3,000 inhabitants.

Besides maintaining a library as one of the features of its work, the Club has from the beginning been a potent factor in the development of Haskell and the surrounding country. It has, in fact, led almost every movement for the betterment of Haskell, and because of that fact it is often referred to as the Women's Commercial Club.

A desire for a club home or community center was born with the organization of the Magazine Club. At first a room was rented and furnished for its use; a few years later a small frame building was purchased, but this was soon outgrown. In 1917 the present home was built. It is a red brick bungalow, consisting of a reception room, the library, an assembly room, a rest room and a kitchenette, and was made possible only through the persevering and untiring efforts of the club members. The building fund was started with an initial subscription of $1,000, and the Club raised the remainder by various means. The original cost of the land and building was $4,500, but the property is now valued at $10,000.

During all these eighteen years the Club has perpetuated the library as a public institution, opening it to the public twice a week. The present building houses the library very comfortably. It is also used for meeting purposes by the other clubs in Haskell, and it is always open to the young people for their entertainments. In fact, the building is known as the community center of Haskell.

MRS. R. R. ENGLISH,
Federation Chairman, Magazine Club of Haskell, Tex.

Profitable Recreation Promoted by Albany Chamber

ALBANY, N. Y.—The baseball games conducted by the Twilight League in Albany last year were made possible by the good work of the Recreation Committee of the Albany Chamber of Commerce, which raised the money required to finance the League. The League was formed at the suggestion of the Commissioner of Charities, and conducted a very interesting series of baseball games, besides a number of other sports, after a plan outlined by the Commissioner. The games were played after business hours, the local daylight saving law making it possible to play them late into the evening. As a recreation measure they proved highly successful, for they held the attention of young athletes from the factories and other walks of life who might

otherwise have found their recreation in other forms.

At the close of the season, more than a hundred of these young men met at the Chamber of Commerce offices one Saturday night to see the large number of beautiful medals, cups, pennants, banners and flags awarded to the winners by Mayor Watt, President Winchester and other officials.

The League has started off this year with even greater enthusiasm and much stronger support. Games are being played this year in every city park and in various fields loaned by public-spirited citizens. One of the local newspapers has offered a trip to the World's Series to the winning ball teams. Between thirty and forty men's teams and twelve girls' teams are playing baseball on a regular schedule. The League is under the direction of its president, George Elwell, who is also chairman of the Recreation Committee of the Albany Chamber of Commerce. Manager McGraw, of the New York Giants, and other prominent New York men have become enthusiastic financial supporters of the League.

ROY S. SMITH,
Executive Manager, Albany Chamber of Commerce.

Campaign for Better Dairy Cows

CONCORDIA, KANS.—A $100,000 corporation called the Cloud County Holstein-Friesian Company has been formed by the Concordia Chamber of Commerce for the purpose of demonstrating the value of breeding a higher quality of dairy cattle than has heretofore prevailed in the county. The plan is receiving the coöperation of the farmers, and the company is really a partnership arrangement between them and the city business men, the farmers holding about the same amount of stock as the city men. The par value of the stock is $100.

A herd of 200 pure-bred Holstein cows will be bought with the funds, and the cows placed with the stock-holding farmers, who will sign a contract to keep them for a period of five years. The assignment of the animals will be made by the Board of Directors of the company, which will select the farmers according to their reputed fitness to care for the animals. The farmer must hold at least two shares of stock for each animal placed on the farm.

The contract with the farmer dairymen will be made on the basis of their sharing equally in the profits. The farmer is entitled to the receipts from all the milk and cream produced by these cows, and half the value of their calves when sold. The cost of veterinary service is to be shared equally by the farmer dairymen and the company.

The plan originated with the agricultural agent of Pettis County, Mo., where it had been in operation for nearly two years when it began to attract attention, and has been copied in a number of other counties in this section. A prospectus of the Cloud County Holstein-Friesian Company outlining the plan, and a copy of the contract with the farmers, may be had by addressing the secretary of the Concordia Chamber.

CHARLES W. COLLINS,
Secretary, Concordia Chamber of Commerce.

Armory and 400 Infantrymen Secured by Commerce Body

ERIE, PA.—When the Erie Board of Commerce learned that Erie was promised an appropriation from the state for a battalion armory if the city would raise $35,000 for a site and recruit a battalion of 400 men for the Sixteenth Infantry of the Pennsylvania National Guard, it took steps at once to secure the enlistment of the required number of men. As Erie has never supported more than one company, the situation presented some difficulties, but the city needed a convention hall very badly and the Board realized that it was its duty to push the matter to a successful conclusion.

The funds were quickly secured, but it was seen early that concentrated effort would be necessary to raise the battalion of 400 men, and the Board therefore assumed entire charge of the recruiting work. The usual forms of appeal through publicity, speeches, calls and entertainments were used. As a final means of stimulating the recruiting, a request was sent to the Government asking that a regular army recruiting team be sent to Erie. A detachment of thirty men with two officers arrived with camouflaged trucks, military displays and a band, and made appeals to the men in the mills and offices, and in two weeks succeeded in completing the required enlistment and in establishing for the first time in Erie a full, four-company battalion.

H. A. DAVIDSON,
Secretary, Erie Board of Commerce.

A Campaign to Curb "Fake" Stock-Selling Companies

HOLYOKE, MASS.—The Holyoke Chamber of Commerce has a wide-awake Securities Investigation Committee which has embarked upon a campaign to protect the citizens of Holyoke and vicinity from being "taken in" by numerous speculative investment companies which have been operating in New England.

HAVE YOU BEEN STUNG LATELY?

Large issues of stock of questionable value have been sold to the Holyoke public and stock salesmen have pocketed enormous commissions.

Get-Rich-Quick schemes are offered by honey-tongued salesmen, who work not, neither do they spin. The wage earner, whose earnings are larger than in former times, is the principal victim.

Can you readily sell your investment or borrow money on it—that is the test.

If your investment is sound, hold on to it: but, if doubtful, before you get hooked in too deep, read in the Telegram and Transcript next week's series of educational investment advertisements, sponsored by the

HOLYOKE CHAMBER OF COMMERCE

Denny B. Goode, Secretary. **P. M. Judd, President.**

John H. Woods, Chairman
Securities Investigation Committee

A series of seven advertisements was prepared by the Chamber's committee, to be used in its fraud prevention campaign. The advertisements are worded so as to attract the attention of the class of people liable to be caught in the nets spread by the smooth salesmen of these companies. An attempt was made to purchase a set of advertisements that would answer the purpose, but nothing suitable could be found on the market, and the advertisements are therefore of the Chamber's own preparation. One of them is reproduced herewith. Care should be taken in the preparation of such advertisements to avoid the use of names or identifying descriptions which may invite suits for slander or libel.

The Chamber learns that although three-quarters of a million dollars was invested by Holyoke citizens in such securities within the past year, not one dollar was invested by them during the first week after the campaign had been launched, and many investors who had not completed payments on their stock are making inquiries regarding the soundness of the securities.

Enrollments for Summer School of Community Leadership

With the enrollment by July 5 of 110 students for the 1920 session of the Summer School of Community Leadership, to be held at Madison, Wis., August 16 to 27, under the auspices of the American City Bureau, attendance at previous sessions will be exceeded by a considerable number. At the corresponding period a year ago, 50 students were enrolled. Just how much the school has grown can be seen from the fact that the enrollment for its first session five years ago totalled just 15 students. Last year the attendance was 191.

The Bureau considers that it was particularly fortunate in being invited by the Regents of the University of Wisconsin to use such buildings on the campus as the needs of the Summer School might require. A determining factor in the selection of this location was the prospect of no overcrowding. Arrangements have been made with the various Greek-letter fraternities adjacent to the campus for the rental of their houses during the school session, and a caterer who handles sessions of this character in various universities during the summer months is to look after the feeding of the visitors. In all these respects the 1920 school will have a distinct advantage over previous sessions.

That a very considerable proportion of the students are planning to combine the school session with a vacation for their families can be seen from the number of requests already recorded for reservations for the wives and children.

Madison offers splendid opportunities for just such a vacation. Aside from the recreational facilities which the city itself offers, all the facilities provided to take care of the 6,000 regularly enrolled students of the university will be available to the summer school students and their families.

English City Department Does Promotional Work*

A CITY department doing the work of a chamber of commerce may seem strange to American readers, but in England at least one municipality coöperates with the business man in the development of the community to such an extent that an entire department of the city government is given over to the promotional work which we ordinarily associate with chambers of commerce in the United States. This is the case in Sheffield. It will be interesting, therefore, to learn how the Sheffield city government is equipped to help in promotional work.

A Development Department has been established in the town hall as "one of the public services of the city to secure the development of Sheffield as a business and commercial center; to encourage and assist the expansion of its staple industries; to secure the introduction of new industries; and to develop vacant land for factory and works purposes."

The Development Committee has nineteen members, all of whom are members of the Town Council. On the Advisory Committee of ten members are representatives of education, commercial, manufacturing and labor organizations. Ten city officials compose the Officials' Committee. There are the following subcommittees: Audit; General, including City Extensions, Civic Survey, Town Plan; Transport; Reconstruction and New Industries; Publicity. The Reconstruction and New Industries subcommittee is composed of representatives of chambers of commerce, the cutlery interests, engineering employers, the University of Sheffield, and the Federated Trades Council.

Among the objects for which the Development Department was organized are the following:

To assist in the expansion of existing industries and in the establishment of new ones

To arrange, in conjunction with the University, for a system of research which will benefit the smaller manufacturers who have not the laboratory facilities enjoyed by the great armament firms

To encourage manufacturers to rebuild out-of-date premises so as to secure better health for their workers; to extend the welfare work which did so much to ameliorate industrial conditions during the war; and to substitute gas or electrical power for steam power, where this is practicable, in order to lighten the smoke nuisance

To assist transport, housing schemes, etc., and to undertake a civic survey and town plan which will guide the development of Sheffield during the next fifty years

To fix routes for roads and to correlate every existing road with all new extensions

To fix areas in which factories may be erected, and probably to prohibit the erection of domestic houses in certain localities, and insure the development of housing extensions

THE WOODLAND SCENERY IN THIS PLAYGROUND IN SHEFFIELD, ENG., HAS BEEN PRESERVED, DESPITE THE FACT THAT THE WATER-POWER AFFORDED BY THE STREAM FLOWING THROUGH IT IS UTILIZED FOR MERCANTILE PURPOSES

* EDITORIAL NOTE.—Here in America we still have chambers of commerce that think it is their duty to "fight" their city governments in order to bring about certain much desired and long overdue municipal improvements. In a rather unusual article entitled "Boards of Trade versus Boards of Assessors" which appeared in THE AMERICAN CITY in November, 1915, Charles H. Ingersoll held the conflict up to ridicule. The efficient board of trade "brings prosperity to a community by promoting municipal improvements, which in turn attract new industries, but compared to the efficiency of the board of assessors, the board of trade," to use Mr. Ingersoll's language, "has to take a back seat." The board of trade brings prosperity—the board of assessors promptly takes it away.

in relation to tram and transport routes
To clear certain slum areas and to provide children's playgrounds

The picture on page 69 shows how the Development Department has helped to preserve the sylvan beauty of one of Sheffield's playgrounds. Through this dale flows a sparkling rivulet which still affords water power to an old grinding wheel or mill, a quaint survival of ancient methods of cutlery manufacture. Although the water-power has been utilized, it has not been developed at the expense of the city's playgrounds.

One of the activities of the Development Department has been to issue a cinema film depicting the municipal, manufacturing and commercial interests of the city. Scenes are shown of public buildings and various places of interest in and around Sheffield, also of the municipally controlled commercial enterprises. Special attention has been given to the industries in the preparation of this film, a large portion of which was made available to manufacturers to display the industries in which they are engaged. The film has been taken on a tour of the world, under the auspices of chambers of commerce and the British consuls in the places visited.

How a Church Helped to Beautify a City by Increasing the Park Area

THE FIRST CHURCH OF CHRIST, SCIENTIST, BOSTON, MASS., PURCHASED LAND CONTIGUOUS TO THE CHURCH AND LAID OUT ATTRACTIVE CONVENTIONAL GARDENS PROVIDING BREATHING SPACES IN A SOMEWHAT CONGESTED PORTION OF THE CITY. VINE-COVERED TRELLISES ON THE WALLS OF BUILDINGS AT THE BORDERS OF THIS AREA ADD TO THE WEALTH OF FOLIAGE

Municipal Reference Libraries as an Aid to City Officials and Chambers of Commerce

SOCIAL and economic developments of the last few years, bringing about constantly changing conditions in the administration of municipal government, have necessitated on the part of city officials, secretaries of chambers of commerce and others upon whom devolve the conduct of civic affairs, an intensified course of study and reading to cope with the problems arising daily. More and more are these people turning to the printed page for solution of the perplexities created by the increasing demands on them in the highly specialized business of conducting municipal affairs in the most efficient manner.

To meet this situation, municipal reference libraries have been established in a number of cities, affording service of inestimable value in solving intricate problems. Special collections of books, magazines, pamphlets and documents covering every phase of municipal activity are within immediate reach, not only of city and chamber of commerce officials, but of all citizens who daily seek information on thousands of subjects. Specially trained librarians have charge of these departments, providing a maximum of service at a minimum of trouble and delay. In many other cities the same work is carried on, to a great extent at least, by public libraries, particularly through special municipal reference departments.

Facts regarding agriculture, industry and commerce; art, science and the humanities; business and the professions, are accessible for all at municipal reference libraries or through the reference departments of public libraries. Does a mayor wish to learn what action has been taken by a city a thousand or more miles away regarding the street railway problem, for instance, a telephonic message to the special librarian brings the information in detail within a few minutes. Does a prospective traveler desire to know some recondite fact as to the customs in the far East, a short conversation with the librarian puts him in possession of the information. A manufacturer wishes to learn of trade-mark regulations in some foreign land; through the same medium he is informed in a very brief time. What was the market price of lead on January 5, 1906? asks a broker, and without delay he is told. Examples without end could be given to show the immense benefit of the institution to the public at large.

Close coöperation upon the part of public libraries and municipal reference libraries with secretaries of chambers of commerce is obviously an essential to the effective working of such a clearing-house of information. Few classes of people are called upon to furnish so much diversified information as librarians and secretaries of these commercial organizations. The latter are indeed fortunate if there is a reference library in the city in which they function. So wide a range is covered in the publications in the special collections that a brief research will shed the required light on practically any question.

Municipal reference libraries undoubtedly mean a large saving in public expenditures. By including in the collections reports of special investigating commissions, documents of civic proceedings in other cities, as well as hundreds of technical books, the need of further commissions to delve into the matter at hand at considerable length and original research is obviated. It often has happened that an appointive body has proceeded to the final stages of an inquiry into certain conditions and then there has come a change in administration and the commission has been discharged. No report of what had been accomplished is left on file, and if the new administration wishes to continue the matter another commission is named and the entire field is again covered, with the resultant added expense. Whereas, had the report of the preceding commission been on file the subject could be continued from the point at which it was dropped.

As an indispensable adjunct to foreign trade the public library is coming rapidly to the fore. Both exporters and importers are employing its service advantageously.

Municipal Finance

BONDING **ACCOUNTING** **TAXATION**

SALE of municipal bonds over the city counter to the public is financing Seattle's preliminary development of power on the Skagit River, a project that will ultimately utilize 600,000 horse-power for transmission over 160,000-volt lines 110 miles in length, harnessing the mountain torrent to serve the industries of the city.

The first authorized issue of $600,000 was offered to the public June 1, and within two weeks one-third of the amount had been subscribed. A constant stream of inquiries from prospective investors indicates that the balance will be taken up rapidly.

The bonds, which bear 6 per cent interest, are in denominations of $100, $200, $500, and $1,000. The first denomination is payable in six years, maturing in ten; the second payable in eleven years and maturing in 13; the $500 bonds are payable in 13 years and mature in 15; and the $1,000 issues are 16-20's. It is the plan to retire $40,000 annually, $200,000 each being issued of the $100 and $1,000 denominations, and $100,000 each of the other two. The $1,000 bonds were practically sold out within two weeks.

This is the second time Seattle has offered public utility bonds over the counter, an issue of $60,000 having been made a little more than two years ago for extensions of the municipal car lines, prior to the transaction by which the city acquired the entire transportation system. At that time more than $200,000 was offered in subscriptions. The favorable reception of the opportunity prompted a pledge that the offering of Skagit bonds would be made direct, which is being fulfilled in the current issue.

Funds thus raised are being applied to preliminary construction on the project, including the building of 23 miles of railroad to connect the site with existing transportation lines, a sawmill with 25,000 board feet daily capacity for camp construction, and the building of a camp that will house from 400 to 500 workmen for three years or more, with especial attention to their comfort and convenience. The railroad is to be completed by the first of January next, according to schedule. A small power plant of 3,000 horse-power is to be constructed on New Harlem Creek, with an overhead of 550 feet to furnish power for work on the big plant.

The first unit will be known as the "gorge plant." It involves construction of a dam approximately 240 feet high, the water being conducted to the power-house through a 10,000-foot tunnel with a cross-section of 400 square feet. Units of 25,000 kilowatts each will be installed.

Other plants of the same size and capacity will ultimately be installed further upstream at Diablo and Ruby. At the latter place a dam 400 feet high will impound storage equal to 1,000,000 acre feet, increasing the low-water flow from 809 to 3,200 second-feet. The head of water between the gorge plant and Ruby will be 800 feet. A total of 600,000 horse-power is to be secured from the stream after the Ruby reservoir is completed, approximately equal to the present entire development at Niagara.

The stream is located in Whatcom County within the Washington National Forest, and permit for its development has been granted to the city by the Federal Government.

In addition to this tremendous potential service, the city has already in operation a plant of 17,000 horse-power on its Cedar River site, which will be more than doubled on early completion of a new unit to utilize the power from flood waters. The water is taken from Cedar Lake, source of the city's water-supply, carried 16,000 feet through a pipe line to the power-house, and thence back to the river 12 miles below the lake. From the river the water is piped to the reservoirs within the city.

HAROLD CRARY,
Assistant Publicity Director, Seattle Chamber of Commerce, and Commercial Club.

A Rational Method of Developing a Shallow-Ground Water-Supply

The Method Applied in Witt, Ill., Should Be Used in All Investigations

By W. P. D. Warren

Miller, Holbrook, Warren & Company, Consulting Engineers, Decatur, Ill.

ONE of the most interesting and perplexing problems which an engineer is called upon to solve is that of developing a supply of water from shallow-ground wells. To the public, the big impounding reservoir, with a "visible supply of water," is a real engineering accomplishment; at times, however, it may be exactly otherwise.

The writer has given some study to the development of both impounded and well supplies and fully appreciates the necessity of the impounding reservoir under certain conditions. The plan of developing water from wells is an extremely old one, and yet one on which the best technical advice should be obtained before final plans for developing an impounding reservoir are adopted.

A Typical Problem

Witt, Ill., is a city of 3,000 population, and inasmuch as the conditions encountered there are more or less typical, it will serve to illustrate the method of developing water from shallow-ground wells, to which it is desired to call attention.

The first information given the writer at Witt was that the City Council, as a whole, wanted a visible supply of water, also that there was no chance for a well supply, as both mines in that vicinity were dry, and further that the only wells near the city were shallow and showed no promise of an adequate quality. Further investigation disclosed the fact that the engineers for the State Water Survey had been over the ground several years previously and had made a brief and valuable report. Below is an extract from the Letter of Transmittal of Paul Hansen, engineer, in which he pointed a way to the proper solution. The date of this letter is June 4, 1913:

"At present there are no available data which would point to a successful water-supply, but it would seem worth while to prospect by means of test wells, especially toward the northeastward, at a distance of several miles, where the city of Nokomis has been very successful in securing an abundant supply of water from wells penetrating sand and gravel in the drift at a depth of about 40 feet."

Investigation of Well Supply

In undertaking to develop a well supply, the writer was limited in the beginning by a resolution of the City Council to the effect that not more than six wells should be drilled. Investigation showed that the mine in the south part of the city and the mine about one mile north of the city were dry, and that the closest known well proposition was at Nokomis, about 4½ miles northeast of Witt. The Nokomis supply is from six 6-inch wells about 40 feet deep, the wells being driven into the drift and passing through 20 feet of soil and clay and 25 feet of coarse water-bearing sand and gravel. The gravel appeared to be of a gray or bluish color with little silt or clay in it.

It was thought that a supply for Nokomis might be located further down, in a general southwesterly direction toward Witt, but east of the closest point to the city limits by about 3,000 feet.

Drilling

The location chosen for putting down test hole number 1 was in about the center of the valley, two miles southwest of Nokomis and roughly in line with the Nokomis wells and the mine test hole one mile southwest of Nokomis, as above referred to. At a depth of 20 feet a very excellent quality of water-bearing sand and gravel was encountered and was found to be 10 feet in depth, giving a total depth of 30 feet for the well. The well driller called attention to the ease with which the well casing and drill seemed to go through this gravel deposit, and stated that the flow of the water appeared to be extremely "free." This gravel was of a grayish or bluish color.

MAP OF THE TERRITORY ADJACENT TO WITT, WHICH WAS EXPLORED FOR GROUND WATER-SUPPLY

In selecting a site for hole number 2, it was decided to choose a point on the west edge of the valley, so the hole was located within a short distance of a little branch entering the valley, and as a result considerable silt and clay were found in the sand. The sand did not run as coarse as in hole number 1, and was of a yellowish color. It was concluded that this hole was on the western edge of the deposit, for it was very similar to holes put down about that time at the mine located one mile south of Nokomis, which was known to be east of the main gravel deposit.

Hole number 3 was about 200 feet east of number 2, but showed much fine sand. Holes numbers 4 and 5, which were about 500 feet north of holes numbers 2 and 3, also showed more or less fine sand. Hole number 5, however, showed better sand, and as it lay more nearly in the center of the valley it was concluded that further drilling would locate the coarse material where the flow through the gravel would be more "free."

Considerable pressure was brought to bear at this time to induce the city officials to stop such "useless waste of money" in drilling holes out in the country and to either put down some holes in Witt, where the city owned several vacant lots, or abandon the drilling entirely. This attitude at Witt was anticipated, and was cleared up only by a careful statement of the methods being followed in the development of this supply.

The Rational Method of Determining Amount of Water Available

In the study of the problem at Witt careful search was made of available works on water-supply from wells, and only a very few authors were found who gave a clear and reasonable method of procedure for the development of a shallow-ground water-supply.

The watershed shown in the accompanying sketch made to the northeast of Witt is 20 square miles in area, a sufficient catchment area from which to secure water for a much larger city. The yield of this area is dependent upon the depth of the saturated water-bearing material. With the large number of holes put down on this area the average depth of saturated water-bearing material was found to be approximately 20 feet.

The velocity of flow is governed in a large measure by the size of the sand and gravel particles, the coarse material permitting the water to flow much more freely. The material ranged in size from fine sand to particles of gravel 1 inch in size.

The available ground storage was determined by learning the length, width and depth of the saturated water-bearing material, computing the storage in gallons on the basis of one-third the volume of sand being void space, and also on the basis that one-third the average annual rainfall,

or 12 inches, was the available underground run-off.

Testing the Supply

Some authorities consider a long-continued pumping test, covering a period of several weeks or several months, as necessary. While a sparkling stream delivered from a well for several weeks will look quite convincing to many, and in fact may prove of some value in a study of the supply, it is probably more often misleading than valuable. As an illustration, assume we desire to test a well by pumping at a rate of 1,000,000 gallons per day for 30 days, also that the deposit from which the supply is furnished has a storage capacity of 60,000,000 gallons, with a somewhat limited watershed area. It is readily seen that the well might be pumped the full 30 days and appear to be strong at the end of this period, when as a matter of fact an additional 30 days' pumping would exhaust the supply. It is readily apparent, therefore, that a pumping test alone cannot be conclusive.

The pumping tests at Witt were carried on over a period of about two weeks. It was frankly stated to the officials at the time, however, that a pumping test over any considerable number of days was not necessary in view of the previous knowledge of the fundamental elements which controlled the supply. The test of the well indicated a large quantity of water available. A yield of 70 gallons a minute was secured when lowering the water level in the well about 8 feet to a depth of about 14 feet below the ground surface. The well was 6 inches in diameter, and equipped with a number 20 Cook screen, 6 feet long. With the greater area of openings in screen or greater lowering of water level a greater yield would be secured. The ground water level was lowered but a little at a distance of 20 feet from the well.

Special Features of the Witt System

The final plan at Witt was to construct a circular concrete pump house 22 feet in diameter, built over two 10-inch wells spaced 18 feet center to center, the pump house being set 10 feet in the ground in order to reduce the lift of the centrifugal pumps. There will really be only about 6 feet of lift for the pumps under present conditions, due to the level of the water in the ground.

A reinforced concrete water tank 20 feet in diameter was built on the highest point in the city. The tank is 100 feet in height, the upper 30 feet having 70,000 gallons storage capacity. Two electric pumping units have been installed, either of which has sufficient capacity to take care of normal requirements. It would probably have been a better plan to install one electric motor and one automobile-type gasoline engine as auxiliary source, each connected to a separate centrifugal pump.

Costs

The total cost of the supply system, including wells, pumping station complete with equipment, 8-inch cast iron pipe line to city limits, a distance of 3,000 feet, and the 70,000-gallon reinforced concrete water tank, was less than $25,000, or about one-fifth the estimated cost of an impounded supply.

The distribution system was let as a separate contract in 1919, and cost approximately $10,000 per mile, including valves and hydrants, the total cost of the distribution system being about $70,000 for the 7 miles. It is thus seen that the entire cost of both the supply and the distribution systems was only about 75 per cent of the estimated cost of an impounded supply alone.

Conclusion

In conclusion it is desired to direct attention to the following propositions:

1. With a saturated water-bearing material located on a catchment area of proper extent, a shallow-ground water-supply may be developed at far less expense than an impounded supply.

2. The radius of investigation for shallow-ground water-supplies should be increased so that it shall not only include the city limits but extend for a distance of 5, or possibly even 10, miles beyond the city limits, depending on local conditions and the availability of an impounded supply.

3. The quality of water secured from one test well in a valley may be entirely different from that in another well in the same general region.

4. The quantity of water available from a saturated water-bearing material should be determined for various cities and should be made a matter of public record.

The Elimination of Dust and Dirt by Street Washing

By J. T. Fetherston
Formerly Commissioner of Street Cleaning, City of New York

STREET cleaning methods during the last thirty years have undergone great changes, for two important reasons: first, a better understanding of the causes of public discomfort due to street dirt; second, the development of modern machinery for removing the cause.

Fine Dust—The Great Offender

Street refuse may be classified as follows:

1. Coarse refuse which is deposited on the pavement surface
2. Rubbish thrown on the pavement by the public in violation of ordinances
3. Fine dust caused by the grinding up of coarse refuse; building material stored on the street; cuts in the pavement; dust from chimneys, etc.

It is the third class that causes the greatest discomfort, expense and danger to the health of the public. This is due to the blowing about of particles of dust which may carry disease germs to be breathed by the people, and the settlement of dust in the houses and upon goods displayed in stores.

It is safe to say that fine dust has been the greatest single cause for recent changes in street cleaning methods. These changes have materially increased the comfort of the public and probably have been instrumental in making many economies in business.

Recent Changes in Street Cleaning Methods

Not many years ago hand sweeping and machine sweeping with horse-drawn rotary brooms were almost entirely relied upon for the cleaning of pavements. Neither of these methods removed more than the coarse material, and sprinkling was extensively used to control the fine-dust nuisance. This at best was only of temporary benefit, lasting only as long as the water remained on the pavement. On hot days the water evaporated so rapidly that its effect was evident for only a short time.

With the increase of motor vehicle traffic and the extensive building of smooth pavements, sprinkling became a fertile cause of accidents both to automobiles and horses, for wet pavements when dirty are very slippery.

In an attempt to find some method of removing the fine dust, development has proceeded along several lines: improved sweeping; pavement washing; cleaning by air movement or vacuum.

The development of better sweeping machines has mainly included an enclosed rotary broom combined with a sprinkling attachment and some scheme for automatically removing the dirt from the surface of the street and conveying it to a compartment, from which it was later dumped, either at the point of disposal or in piles upon the street.

Pavement Washing Generally Effective

The developments in pavement washing have been widespread and varied. They may be classed in three general groups: hand flushing; machine flushing; squeegeeing.

The first method, while it appears to be the most efficient, is generally more expensive than the second, because of the labor required, the larger use of water, and the limited area covered.

The second method has progressed from the horse-drawn machine using a sealed tank and depending upon air pressure to force the water through the nozzles, to a horse-drawn machine with an auxiliary gasoline engine and pump mounted at the rear, and finally to a motor-driven flusher either with an auxiliary motor and pump mounted at its rear or utilizing the truck motor to drive the pump as well as to propel the machine.

With motor-driven units it is now possible to cover large areas at a minimum of expense and with an economical use of water. It is also possible to work the equipment for sixteen or more hours per day, which means a material reduction in cost and meets the requirements of the city where the business section can be cleaned only at night but where the residential dis-

tricts can be cleaned during the day.

The modern flusher will remove not only the small particles of dirt but the coarse material as well from either rough or smooth pavements and will do a better job on pavements in poor repair than can be performed by other types of apparatus. It successfully combats the fine-dust nuisance, following nature's method of cleaning with flowing water liberally applied. In the hot summer season a wet-cleaned street is a great relief, actually and psychologically.

Cleaning by Air Movement or Vacuum Still in the Development Stage

Cleaning by air movement or vacuum is a recent development and must as yet be considered only in the experimental stage. Its greatest success to date has been in naturally dry climates or in cities where the temperature in the winter goes below freezing for a considerable period, yet whose streets are generally free from snow. In other words, vacuum cleaning is used in locations where flushing is prohibited by

CONCRETE PAVEMENT ON MT. PLEASANT AVENUE, FT. THOMAS, CAMPBELL COUNTY, KENTUCKY. A GREAT IMPROVEMENT OVER DUSTY DIRT ROADS

The third method is limited to smooth pavements. Squeegeeing may be termed the mechanical scrubbing of pavements with a rotary rubber squeegee attached to a horse-drawn or a motor vehicle. A tank of water is carried which supplies the sprinkling nozzles in front of the squeegee. It has been found that squeegeeing is limited in its effective performance to smooth pavements in good repair. It is only locally applicable and has had a limited use.

temperature, yet where fine dust must be removed. The machines so far built have been only partially successful in cleaning rough pavements.

Generally speaking, it may be said that the air movement equipment, while successful in some communities, has so far failed to meet the demand for a machine which will be generally usable and which at the same time will successfully solve the fine-dust problem.

At least one road engineer will get adequate compensation for his labor and skill—Texas has raised its state highway engineer to $10,000 a year. He is the highest paid of all the state officials, but who is doing more important work?

The Pageant of "The Light" Makes Clear the Duty of Any City to Its Schools

By Charles H. Lake
Assistant Superintendent of Schools, Cleveland, Ohio

WHEN the National Educational Association held its annual convention in Cleveland last February, the visiting members were given an opportunity to attend a performance of "The Light," an educational pageant written for the occasion by Miss Catherine T. Bryce. Since the initial performance, "The Light" has been presented in scores of American cities and towns and has come to be considered a distinct contribution to the field of educational literature. It is written as an allegory in which the principal character, "Any City," is shown the various stages in the learning process by the supporting character, "Education."

As the play opens, Any City is seated in his study, considering the different items on the tax budget of the city for the coming year. Settled comfortably in his easy chair, he approves item after item of the budget, hesitating only over the appropriation for the schools of the city, which he cuts down in order to avoid reducing the budgets for the other departments. With the accomplishment of the work of adjusting the budgets so that all departments, with the single exception of the schools, shall have all that is needed, Any City falls asleep, and Education, holding aloft her light, appears before him in a dream and shows him a series of pictures of the development of education through the ages. Education has had many names, and one after another they occupy his attention. Scenes depicting Experience, Tradition, Invention, Training, Discipline, The First Lesson in Democracy, The Book, Force, Training for Democracy, The Warning, and The Summation of Education's Dream, pass in succession, as Any City looks on with ever-increasing interest.

Education first shows him a typical illustration of teaching by experience. She takes him back through the ages to the time of the earliest Indian inhabitants of the earth, who learned only by bitter experience that some of the pretty fruits of the forest were not for the use of man.

Tradition is represented by women grinding corn between two stones. One of them ventures to suggest that there may be some better way to grind corn, but the others rail at her for even thinking of using anything different from the methods handed down to them in tradition.

A scene from Hiawatha in which picture writing is introduced typifies invention. Training is represented by groups of Greek boys and girls in athletic contests and dancing, and discipline by the Roman soldiers whose fortitude never wavers in the most trying crisis.

The first lesson in democracy is a scene in a feudal castle of the days of King John. A humble subject expresses a longing to have a part in the educational advantages of the time—to read the illuminated books, to play and to sing as the troubadour sings. The lord of the manor rebukes him savagely and tells him that such things are only for the nobles; but a minstrel present who has just come from the king's court tells the baron that things are no longer so, that the Magna Charta has been signed and henceforth justice shall be denied no man, be he baron or serf, and from this time on education tends toward democracy.

Force is represented by the old-time "dame school," where the bundle of switches, the dunce cap and stool, and other early methods of punishment were much in evidence.

A model school is shown in the next picture. In this school there is a well-trained teacher; the individual interests and aptitudes of the pupils are receiving consideration in the wide range of work that is being given. The equipment is good. This sort of school is made possible by liberal tax schedules and a progressive attitude on the part of the taxpayers. Miss Bryce says, through one of the characters in the pageant:

"No sacrifice is too great for the public to make that all schools in the country may be brought to this, may be advanced beyond it. It is owing to the self-denial and patriotism of the best teachers of America that the average

SCENE FROM THE PAGEANT OF "THE LIGHT," REPRESENTING THE WAYS OF TRADITION—WOMEN GRINDING CORN

standard of her schools is as high as it is to-day; it is because of their untiring efforts that America has schools to-day beyond the price the public is paying for them.

"It is to the school children of to-day, children with a thorough education, trained to think and act for themselves, who have learned to stick to a thing until it is finished, children who are healthy and courteous and patriotic, that you must look for the controllers of the future destinies of America. Upon the training you give them now depends the fate of the nation in the years that are to come. We are at the dividing of the ways. The public must either provide the means for the democratic training of all boys and girls or permit class distinctions in citizens of a republic."

The "Warning," a contrasting picture, shows a school in which a poorly trained teacher tries to "keep school" under most distressing conditions. The schoolroom is crowded with children who have to work under such handicaps that they have no respect for the school nor their attempts at education.

The pageant closes with a summation of Education's dream. In the background are shown the past steps in education, and in the foreground the children who are the hope of America.

As the curtain goes down on the final picture, Any City awakes and, of course, revises upward the budget for the schools.

Miss Bryce is an author of considerable note, having written several elementary readers and volumes of stories for children. Until recently she has been at the head of the elementary grades in the Cleveland schools, but has now become Assistant Professor of Elementary Education in the newly established School of Education at Yale. As such, she will occupy the unique position of first woman professor in the history of Yale.

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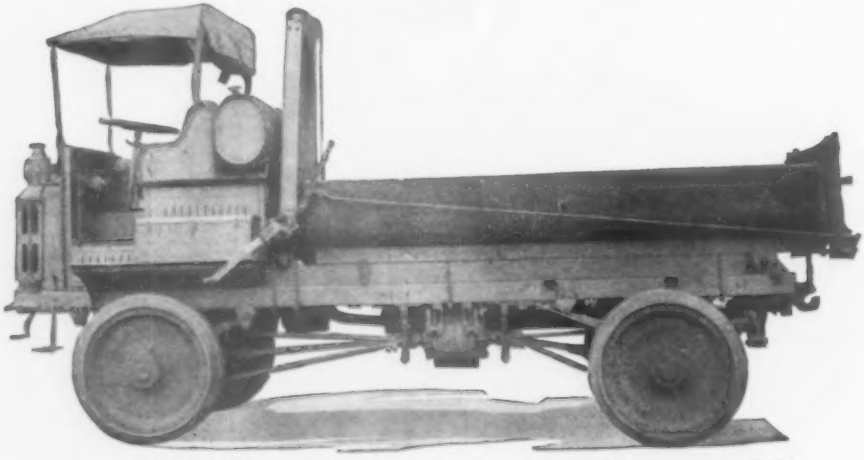

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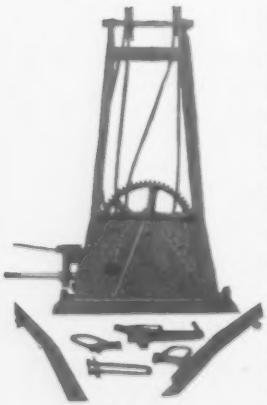

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Small-Town Problems

By Karl B. Lohmann

Town Planner, Pennsylvania State Bureau of Municipalities

TOWNS must be more than a mere collection of houses, stores and factories. They should be places in which residents can take pride and comfort, where the normal expectation is growth and development, and the proper object of such development is production of one form or another based upon healthy living conditions.

They should embrace a proper system with appropriate alignment, gradient and widths, adapted to the present and future demands of traffic. They should include parcels of land, appropriate in size and location, held in advance for the public structures that must come in the life of the town. They should give recognition of the fact that no small town can expect to clinch its hold as the recreative center of the open country or as a real home town, unless there are places of play and wholesome rest, parks and playgrounds for children and adults.

Moreover, the right sort of town requires that homes must be more than mere houses. They must be attractive and convenient in character and equipment, with adequate surroundings provided, and where the districts in which they are located are not defiled by unsightly, noisy and ill-smelling industries. Our small towns must be clean —clean in air, water and drainage—clean of obstructions on the streets, of litter, poles and wires, and billboards; clean of tin cans and ashes in the yards, and trimmed up where possible with grass, flowers, shrubs and trees. We must never forget that an unclean town cannot be wholesome, healthy and attractive until it is made sanitary and clean and green.

If in such considerations as the above we discover how far and wherein we have fallen short of the physical standard of the ideal for small towns, it devolves upon each of us to help lift to that standard the various features of the town.

That may be accomplished best if incorporated in some definite purpose or program. France recently passed a law compelling every town and village to lay out its future development according to principles of modern city planning—or, in other words, in some kind of definite program. Each of our towns might heed that wonderful example. It is entirely possible and practical for them to do so. It is merely the application of good business principles, wherein a plan or program of action is the guide.

By working together, the town council, the city commission, the chamber of commerce, the civic improvement society, or any one of several organizations, has it in its power to make important strides in the preparation of a concrete study or ideal towards which the town should move.

In small towns where a comparatively new policy is to be inaugurated, the latter is often met with a persistent prejudice and indifference that manifests itself in misunderstanding and cross-purposes within the community. The spirit will vanish when the people fully realize that the development of healthy, efficient and self-sufficing towns, according to the best modern practices, is absolutely essential to the best development of the people within such towns and indispensable to the fullest development of our country life, and that it is to the best interests of industry and production.

What an extraordinary call such possibilities for general welfare make upon our civic conscience. It opens up an immense field of possible service wherein fairness, understanding, cordiality and community spirit must flourish and opens the way toward better towns.

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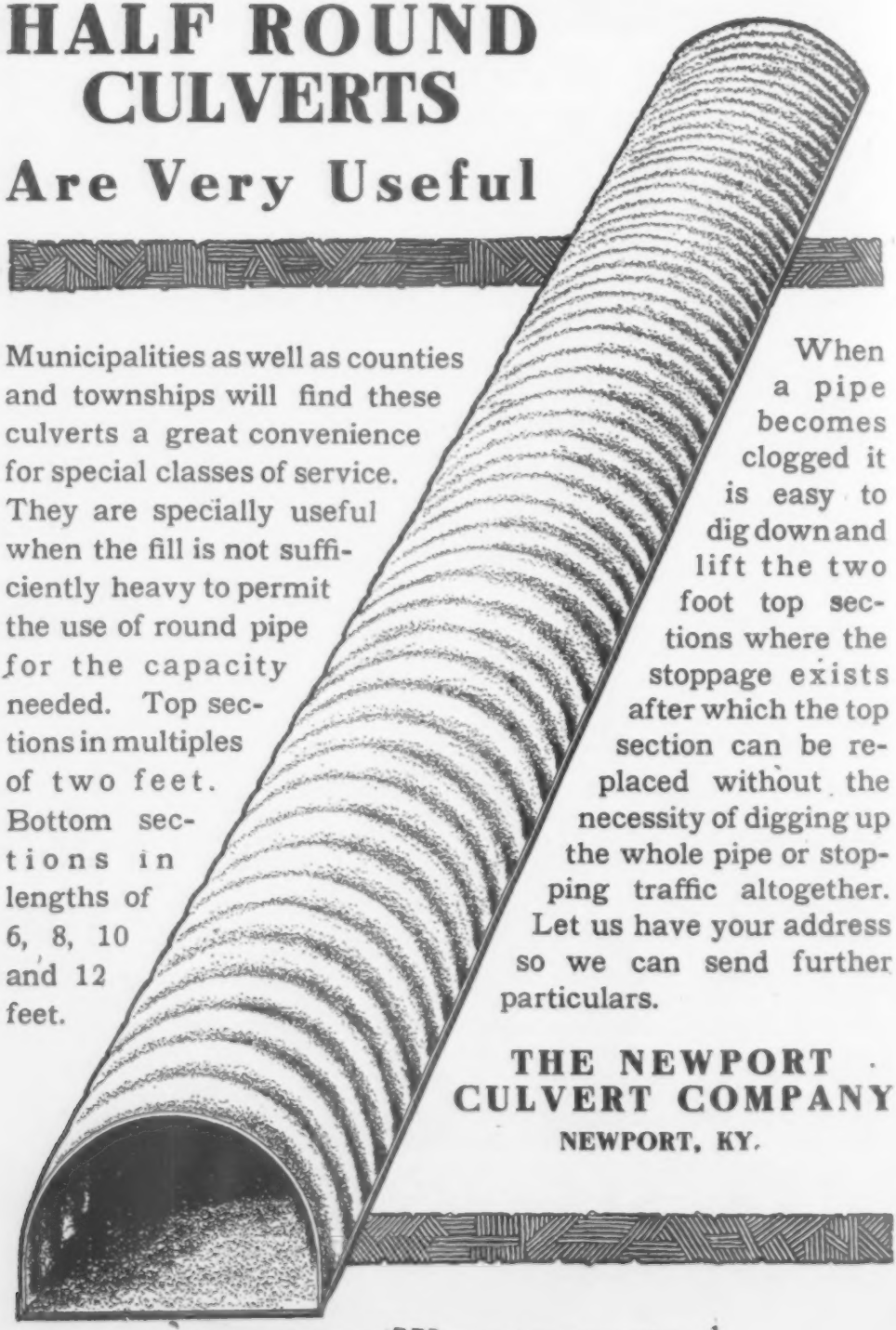

Municipalities as well as counties and townships will find these culverts a great convenience for special classes of service. They are specially useful when the fill is not sufficiently heavy to permit the use of round pipe for the capacity needed. Top sections in multiples of two feet. Bottom sections in lengths of 6, 8, 10 and 12 feet.

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Letting Nature Seem to Have Her Way in City Parks

The Development of Rock Creek Park, Washington, D. C.

By John B. Woods

THE latest effort to join the two largest parks in the National Capital and thus link the Potomac river front with the semi-wilderness of the Rock Creek valley promises to be successful. The problem, aside from the matters of obtaining money and condemning the necessary land, is one of redeeming a neglected and ill-appearing ravine and improving it to such a degree as to place it upon an esthetic plane with the two larger preserves. This ravine is at present given over to dumps and warehouses and a canal terminus, while the upper reaches of the same valley have long since been developed into a wonderland of forest and meadow. In the final working out of the plans for Rock Creek Park, and in the linking of it with Potomac Park and the Mall, many interesting features of engineering have been brought out, and there are several valuable points to be noted by all who are devoting time and thought to the general subject of city parks.

The Ravine as an Asset

Many of our cities are scarred with ravines and stream beds. Sometimes instead of deep-cut valleys there are muddy and marshy flats with lazy creeks or rivers meandering through. And often the general idea of those concerned is to fill up these places as soon as possible. They are objects of scorn and the cause of a considerable wave of civic shame at every election time. As a matter of fact, a deep valley, even though it be the natural receptacle of all tin cans and other cast-off material from every house within easy hauling distance, is susceptible to a type of development that makes it a positive asset to the community. There is nothing more delightful than a natural watercourse, and most ravines have streams at their bottoms, or would have them if nature were not kept from her own devices by man-made piles of rubbish.

Rock Creek Park, with its two thousand acres of wilderness, criss-crossed with bridle paths and motor roads, was formerly such a ravine, cutting the northwestern section of Washington in a north-and-south direction. But after a few years of intelligent effort the creek valley has become probably the most natural and delightful recreation spot inside the borders of any eastern city, and its makers are now looking forward to the last step in its consolidation with the other public lands. What Washington has done can be accomplished by any other city and should be attempted by every community that is blessed with usable land in the form of stream valleys or ravines.

Clearing up the Borders

One interesting result of improving such waste places is the change in building enterprises which take place along the rim of the parks. In the old days Washington was cursed with many old tumble-down shacks, perched upon the edges of the ravine. Toward the lower end of the valley there were power plants and unimportant factories of one kind and another, whose chief characteristic in common was lack of beauty either of line or coloring. But with the development of the great park a new idea came into common circulation, and people began to understand that a park was a splendid thing to have as a front yard. So building lots on the streets overlooking the park came to demand premiums in the market. New subdivisions were opened up and taken by builders. And naturally the types of houses erected upon such lots were in keeping with the enhanced values of the land. In other words, the park brought an immediate and considerable increase in property values and indirectly caused the building of better homes along its borders.

Formerly the region on the western rim of the valley was occupied by farmers and small shack owners who worked for them. But the farms have now been put into large estates or subdivided into improvement settlements, and many splendid residences overlook the wooded ravine. An incongruous

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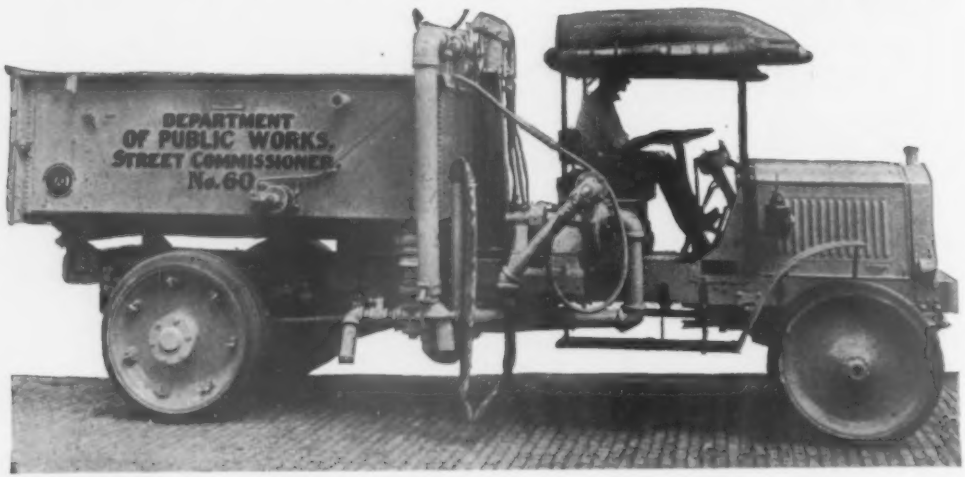

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STONE BRIDGE OVER RAPIDS IN ROCK CREEK

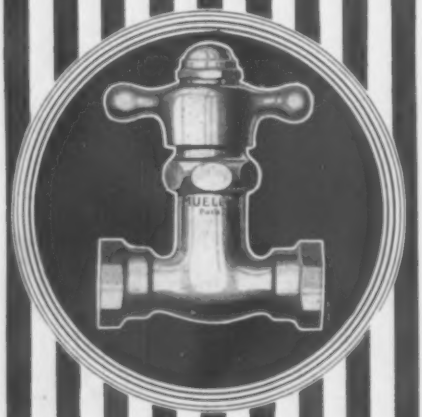
example of the general effect is found in the gas-works which squats in the midst of a newly developed exclusive residential section at the lower extremity of the valley. The gas-works has been there several years, but the fine homes have come recently as a result of the latest extension of the building of a beautiful bridge from the vicinity of Sheridan Circle.

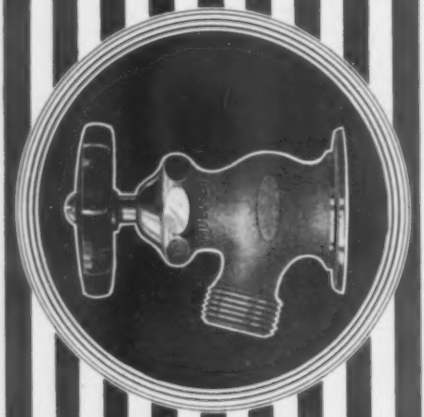
Beauty and Convenience in the Park

Of course, there are several principal needs which a good park must meet. They may be hastily summed up as trees, grass, water, roads, bridges, and resting places. The working out of various combinations of such features is the congenial task of the park engineer, and should be a soul-satisfying labor for any man. In Rock Creek Park the stream naturally is the jewel, with its frequent rapids and occasional dam to give a pond now and again. On either side of the creek well-kept roads for motor traffic wind through narrow meadows, while bridle-paths also cross in and out. Back on either side the ground is broken in small hills which form somewhat irregular valley walls. These slopes are heavily wooded with many hardwoods and one or two of the yellow pines. Unfortunately, the chestnut blight has made serious inroads upon the chestnut trees, and a considerable work of clearing away dead trees is in prospect. In this climate, however, the other species will soon fill the vacancies left by the dying specimens.

One special feature is the National Zoological Garden, which has been joined to the main park and is open to everybody every day. Footpaths traverse the hills and cross the creek over rustic bridges, and the bridle-paths also wind about through the semi-wilderness. Hard-surfaced roads lead away toward the city and toward Connecticut Avenue, in fairly easy grades. Comfort stations have been provided in close proximity to the most favored of the picnic spots, but they are practically hidden in the woods. So well has everything been planned that a thousand automobiles, hundreds of horsemen and thousands of picnickers and pedestrians can use the park together without undue crowding.

In the development of the principal stream the effort has been made—and with success—to have wild water and rocks alternate with quiet ponds where wild ducks swim about. Stone dams have been built, and along the margins of the ponds willows have been planted. Where there are rapids the stream has been left alone, except for an occasional abutment of rock to keep the banks from washing away in time of freshets. Four fords have been built, with bridges to handle the motor and animal traffic when the water is so high as to render fording a dangerous matter. The fords have been paved with rock, and small





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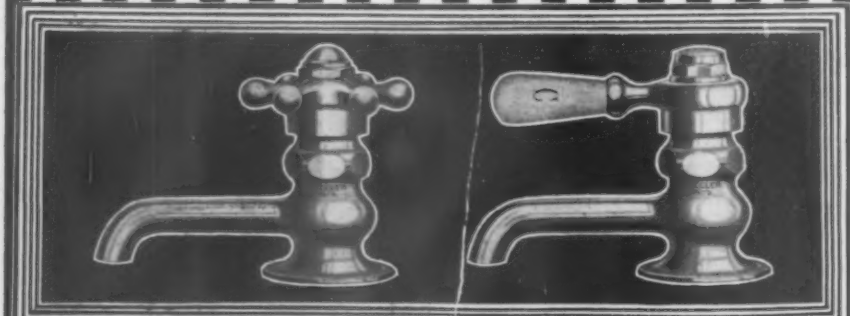

dams have been laid across the stream above the fords to control the water flow. These crossing places are of peculiar interest in view of modern motoring, for the automobiles make use of them to the exclusion of all bridges when the water is favorable. In fact, they are a distinctly popular feature.

Bridges have been designed to carry out the suggestion of forest conditions. Paths are carried across the streams on rustic structures of poles and planks, and the roadways are linked with stone and concrete spans with graceful arches. The automobile roads have been planned with great skill, and several bridges have been built across the heads of tributary ravines to carry the roads out of the park on both sides. Three particularly good summit drives are provided, overlooking the woodlands below. There are several entrances on both sides of the valley, and a single criticism might be made of them. It would be more convenient for the motoring public if guiding signs were placed at all the approaches to the park instead of at only one or two. Several of these entrance roads are all but hidden in a maze of streets, and motorists often make mistakes when searching for the proper routes. There are many parks in various cities which might be rendered more accessible by guide-posts placed at considerable distances from the actual gateways.

For nature lovers it is only necessary to indicate paths; given the suggestion, they will wander back into the forest to rest and enjoy life. The problem of caring for people who prefer the grass plots and meadows is somewhat more difficult. A few shelters have been provided for such parties who may be caught by sudden showers, and rustic seats are to be found among the copses and along the banks of the stream. One good and sensible feature of the picnic equipment is the use of concrete luncheon tables, which may be kept clean even out of doors. Several springs of pure water have been made available for picnic use. Parking spaces have been prepared for cars. In brief, the picnic is an institution of the park, and the people respond by taking proper care of their papers and boxes, throwing them into the wire receptacles provided for them.

Nowadays the wilderness, if it has good roads traversing it, is more popular than formal landscape. And city parks may be converted into such wilds by simply allowing Nature to have her way. If forests can be combined with meadows, and watercourses included, the result is entirely pleasing and suits a multitude of human tastes. Any city with an unsightly ravine or swampy river meadow may consider with profit the manner of improving Rock Creek in the District of Columbia.

On the Calendar of Conventions

JULY 26-30.—TORONTO, ONT.
International Association of Fire Engineers. Annual convention. Acting Secretary, Stephen E. Hoey, Room 1130, Municipal Building, New York City.

AUGUST 3-7—ST. THOMAS, ONT.
Dominion Association of Fire Chiefs. Annual convention. Secretary, Chief James Armstrong, Kingston, Ont.

AUGUST 9.—CHAPEL HILL, N. C.
North Carolina Commercial Secretaries' Association. Annual meeting. Secretary L. H. Duncan, Rocky Mount, N. C.

AUGUST 10.—PORTLAND, ORE.
American Society of Civil Engineers. Annual convention. Acting Secretary, H. S. Crocker, 33 West 39th Street, New York City.

AUGUST 16-17.—MADISON, WIS.
Wisconsin Association of Commercial Secretaries. Annual meeting. Secretary, Don E. Mowry, Board of Commerce, Madison, Wis.

AUGUST 17-27.—CHAUTAUQUA, N. Y.
Open Forum National Council. Summer school of open forum methods. Secretary, Harold Marshall, 359 Boyleston Street, Boston, Mass.

AUGUST 24-26.—YORK, PA.
League of Cities of the Third Class in Pennsylvania. Annual convention. Secretary, Fred H. Gates, City Clerk, Wilkes-Barre, Pa.

AUGUST 25-27.—WINDSOR, N. S.
Union of Nova Scotia Municipalities. Annual convention. Secretary, Arthur Roberts, Town Solicitor, Bridgewater, N. S.

SEPTEMBER 7-10.—HOLYOKE, MASS.
New England Water Works Association. Annual convention. Secretary, Frank J. Gifford, Dedham, Mass.

SEPTEMBER 13-16.—LOS ANGELES, CALIF.
Pacific Coast Association of Fire Chiefs. Annual convention. Secretary, Ex-Chief H. W. Bringhurst, Seattle, Wash.

SEPTEMBER 13-17.—SAN FRANCISCO, CALIF.
American Public Health Association. Annual meeting. Secretary, A. W. Hedrich, 169 Massachusetts Avenue, Boston, Mass.

SEPTEMBER 20-23.—NEW ORLEANS, LA.
Southwestern Water Works Association. Annual convention. Secretary, E. L. Fulkerson, 617 Washington Street, Waco, Tex.

OCTOBER 12-15.—ST. LOUIS, MO.
American Society of Municipal Improvements. Annual convention. Secretary, Charles Carroll Brown, 404 Lincoln Avenue, Valparaiso, Ind.

OCTOBER 13-15.—AMHERST, MASS.
American Civic Association. Annual convention. Secretary, E. E. Marshall, Union Trust Building, Washington, D. C.

OCTOBER 16-19.—SPRINGFIELD, MASS.
American Country Life Association. Annual conference. President, Kenyon L. Butterfield, Amherst, Mass.

Before Using Tarvia

South Denton Street, Gainesville, Texas, a gravel road before treatment with Tarvia. Note how road has gone to pieces under traffic.

After Using Tarvia

The same section of street after re-surfacing with local gravel, made smooth, dustless and traffic proof by treatment with "Tarvia A" and "Tarvia B".

"There are no arguments against saving what you've got"—

THE war taught us many things, not the least of which was thrift—pertinently termed "saving what you've got." Thrift showed us that last year's shoes could be resoled and that the old suit—with little mending and pressing—had another year's wear in it.

It showed many cities and towns that the policy of "saving what you've got" could be applied to their road problems. They reasoned this way:

"High costs may offer good arguments for delaying new road construction at this time, but *there are no arguments against saving what you've got.* To neglect the roads already built is waste, and *waste is a crime.*"

If your macadam roads are good, keep them good; if they're in bad shape, *repair them!*

That may mean Tarvia patching and surface-treating; the widening of narrow roads by adding Tarvia macadam shoulders, or it may mean utilizing the old macadam as the foundation for a traffic-proof Tarvia top.

Road improvements like these are not makeshift methods. They are the logical solution of the good roads problem in hundreds of communities today.

Best of all, the cost is low, the maintenance cheap and the satisfaction a blessing to the entire community.

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Our engineers will gladly consult with you, without obligation, in solving your road problems with Tarvia.

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In order to bring the facts before taxpayers as well as road authorities, The Barrett Company has organized a Special Service Department which keeps up to the minute on all road problems. If you will write to the nearest office regarding road conditions or problems in your vicinity, the matter will have the prompt attention of experienced engineers. This service is free for the asking. If you want *better roads* and *lower taxes*, this Department can greatly assist you.

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Gravel road in Bridgeton, Maine, maintained with "Tarvia-B"

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The Roads That Bridge-Tolls Built

New Highways of Clarke County, Washington

By B. L. Dorman
Clarke County Engineer

THE first motive which prompted the county officials and good roads boosters of Clarke County, Wash., to interest themselves in intensive road improvements was to aid the county in giving employment to the hundreds of boys who had given their services to their country in the great war. This, under the conditions of our finances, was a difficult problem, and, if carried out to an extent that would be of any appreciable benefit, must of necessity tax our resources to the limit.

The assessed valuation of the county at the beginning of 1919 was about $15,000,000. According to the law we could bond the county for 5 per cent of the assessed value of the real property. In 1914 the county voted bonds for $500,000 to pay for Clarke County's share of the Columbia River interstate bridge, which spans the Columbia between Vancouver and Portland, Ore. To reimburse the county for this expenditure without taxing excessively, the toll system was established on the bridge, and the bonds were to be paid for from this revenue.

The Bridge Revenues Piled Up

The bridge was opened to traffic February 14, 1917, and in July, 1918, $50,000 was applied on the bonds. Meanwhile the traffic across the bridge increased wonderfully and the revenues accordingly. Some of the bonds could not be redeemed for more than ten years, so this meant that we must either reduce the price of tolls, allow the bond redemption funds to pile up in the treasury, or devise some way of using them.

It was suggested that we might use some of the money to pave our highways, but this suggestion brought forth many protests from those who paid heavy tolls for crossing the bridge. By the persistent efforts of the county officials and good roads boosters, however, the State Legislature of 1919 passed a bill permitting the county to use the net revenue from the bridge in construction of hard-surface pavements until June 1, 1921. It was estimated that this revenue would run from $10,000 to $15,000 per month.

There is another law whereby the county may construct paved highways under the local improvement plan; the property adjacent to the road for a distance of two miles on either side should bear 25 per cent of the cost of the improvement, the road district in which the highway is located 25 per cent, and the county at large 50 per cent. The local improvement district has ten years in which to pay its portion of the cost on the installment plan, and the district and county five years. The law also gives the County Commissioners the right to incur a bond issue for 3 per cent of the assessed value of the county, to apply under the provisions of this act.

We began with a little talk and a few newspaper articles on "How we might get out of the mud." Within two months there were petitions filed with the County Commissioners for more roads than we could build in two years. Our allotment of Federal Aid funds for the years 1919 and 1920 was $336,700. We promptly matched it with our interstate bridge funds, for which we have completed and under contract 18 miles of hard-surface pavement. We have also contracted this year for 27 miles of hard-surface pavement at a cost of $658,900 under the local improvement plan.

Details of the Work

Two projects are under contract with the state, county and Federal Aid funds: The North Bank Highway, (sometimes known as the Evergreen Highway) from Vancouver to Camas, and the Pacific Highway from Salmon Creek to Pioneer. The construction on each of these projects is concrete pavement 20 feet in width with an average thickness of 6¾ inches, being 6 inches on the edges and 7½ inches in the center.

The gravel and sand for these roads is taken either from the Columbia River or from Salmon Creek, which crosses the Pacific Highway. Gravel from the Colum-

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bia River has only to be screened to be ready for use, but that taken from Salmon Creek must be washed and screened. Columbia River sand of a splendid quality is available at many points along the stream, and is taken from the river with clam-shell diggers, loaded onto scows and delivered at almost any convenient place along the river.

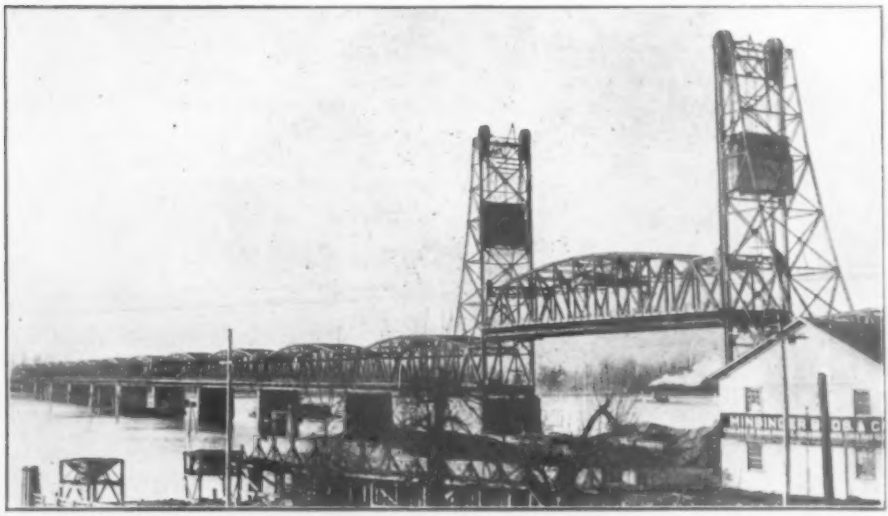
The construction of the road on the North Bank Highway necessitated the expenditure of a considerable amount of money. The old road-bed was from 16 to 20 feet in width and had many unnecessary steep grades and sharp curves, besides two grade crossings over the North Bank Railroad. We have entirely eliminated the grade crossings, reduced the grade of the road to a maximum of 5 per cent, and with one exception the greatest degree of curvature is 10.

Running along the bank of the river, as the road does, this work required about 55,000 cubic yards of excavation, and the same amount, practically in embankment, over a distance of 9 miles. This stretch of pavement, when completed, will comprise the first link of hard surface on the North Bank Highway, which parallels the famous Columbia River Highway on the Oregon shore for about 100 miles and then breaks over the great wheat fields of Klickitat County, across the Simcoe Mountains and into the wonderful valley and city of Yakima.

Paving on the Pacific Highway stretch is of a much easier nature, as the heavy work of construction has been completed for a number of years, and the dangers of slides, settlements and washouts have thereby been eliminated.

All the pavements laid under the local improvement plan have been of bituminous construction. There were three types used in this work. Where it was possible to make use of an old macadam road, the specifications called for the reworking of the old macadam into the desired shape and width for the pavement, and the addition of enough extra broken stone or rock to make a dense foundation of at least 6 inches of thoroughly compact material. Upon this was laid the previously mixed bituminous material to a depth of 2 inches after compression. In this country, where the supply of basalt rock and gravel is almost unlimited, we have quite a large mileage of this kind of road.

On newly constructed roads, however, or roads where the old macadam was not of a suitable nature to permit the use of the redress process, our specifications call for a new crushed rock base of not less than 4 inches after being thoroughly compact, or a



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bituminous mixed gravel base of not less than 3 inches, and the wearing course of 2 inches.

In the latter two classes of pavement, local conditions usually enter into competition. In some localities there are no basalt rock quarries, and the streams afford a considerable amount of gravel. In such localities the bituminous mixed gravel pavements were used, as a considerable saving could be made by the use of local material.

In all these improvements particular attention was paid to alignment and grades. Where it was difficult to make the alignment and grade harmonize, preference was given to the alignment. All curves were reduced to the least possible degree, and in many instances extra right of way was secured to get the desired result; as in the case of a right-angle turn in the road, we held the curve to a minimum radius of 120 feet, thereby pulling the new grade entirely off the old road and placing it on newly acquired right of way on the adjacent property.

The pavement on all curves of one degree and greater was made flat in cross-section, and superelevated at least 8 inches and greater according to the degree of curvature; besides, the pavement on all curves was widened from 2 to 6 feet at the center, the widening being carried out at either end of the curve. The pavements on all the county highways are 16 feet in width, with earth or gravel shoulders from 3 to 4 feet in width, according to the importance of the road.

We have found that it is particularly important to keep the road-bed for a hard-surface pavement as much above the elevation of the sides of the road as possible in order to secure the most efficient results in keeping the subgrade dry, and thereby insure the least possible danger from damage to the pavement.

In the construction of the foundation for a pavement, engineers usually try to follow a rule of making the quantities in excavation equal as nearly as possible the quantities in embankment, in order to save the loss of waste material, and borrow for the fills. This rule should not be adhered to in wet climates. It is better, if possible, to spend more money on the subgrade by filling the low places with material from borrow-pits or the ditches along the sides of the road, provided no ditches or pits are left that are dangerous to traffic.

Work Under the Local Improvement Plan

On improvements made under the local improvement plan, the amount assessed to the abutting property is fixed by a board of appraisers who are appointed by the County Commissioners. The appraisers must be residents of the county, but living outside of the improvement district. They are required to view each tract of land in the district and make the assessments against the property according to the benefits derived from the improvement. As no other fixed rule is made in the law, much of the work of a proper equalization of the assessments is left to the judgment of the appraisers. The physical features of the district must be taken into consideration in making the assessments, and in a locality cut by streams and rugged country much of the territory is benefited little, if any, by the improvement, thereby placing the burden of the assessment more heavily upon the portion more directly benefited.

In one of the more ideal districts where the length of the road improved was 12 miles, the district was divided into eight zones of one-fourth mile in width, each zone lying parallel to the road being improved. The rate of assessment per acre was fixed at $5.50 for the first zone, $4.25 for the second, then $3.00, $2.00, $1.25, 75 cents, 50 cents and 25 cents respectively. In addition to this, where a small unincorporated town or trading center was situated along the road and the land was platted into small lots for residence or business property, the assessment was made much higher per acre than elsewhere.

Summing up the assessment under this plan gave the appraisers an amount of about 5 per cent in excess of that required. This amount of surplus funds was used to relieve assessments in parts where for obvious reasons the property was benefited little or not at all.

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How a City Welcomes Motor Tourists

By Charles A. Simmons
Manager Western District, American City Bureau

AS each touring season sets a new mark for the number of automobile parties motoring throughout the length and breadth of the land, cities are giving increasing attention to the subject of catering to the needs and comforts of these visitors within their gates. So it is that the number of tracts of land set aside as free camping grounds for motorists is constantly increasing.

Depending upon the attention which has been given the subject, these parcels of land represent, to some degree, the warmth of the invitation which the city extends. Some of the parks are merely pieces of land otherwise unused, with no facilities and little attractiveness; few efforts are made tending to improvement. Weeds and boulders, lack of potable water, absence of firewood or other means of providing comfort, are conspicuous features. The approaches are ofttimes unhandy, or even dangerous.

Other cities have shown more consideration for these visitors, coming, as they are, in increasing thousands, and attempt to make the stay one to be remembered, so that there may be passed on to others good words for the city which has thus shown its hospitality. These itinerant guests sometimes take with them more visible evidences of their appreciation, in the form of merchandise purchased in retail establishments.

Many western cities have shown special activity in preparation for the coming season's avalanche of families out to "see their own country." All signs indicate that touring in the season of 1920 will be unusually heavy, and alert civic-commercial organizations have given the subject special attention. This is especially true in places through which much of the interstate or transcontinental traffic is naturally routed, and which realize they should not disregard the strangers within their borders.

The city of Marysville, in northern California, is one of the places that have placed a high value on the extension of courtesy to tourists. A centrally located plot of

SHELTER IN AUTO PARK IN MARYSVILLE, CALIF., IN USE BY A TOURING PARTY

Provision is made for swinging hammocks. Well-kept grounds with green plots and shrubbery are an invitation to tarry. Merchants profit by the patronage of establishments listed in a bulletin of donors to the cost of construction

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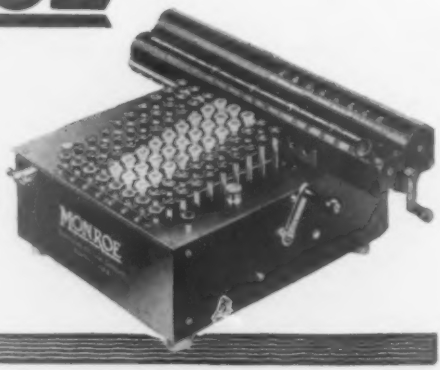

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ground has been set aside for auto camping parties, and there they find equipment which induces many of them to remain for periods of several days.

The park is located within the city limits, and main arteries of travel are posted liberally with directions for reaching it. There are twelve shelter houses, each suitable for one party. They are equipped with quarter gas meters which work if one has the necessary coin. There are water hydrants and garbage and waste paper receptacles. There is a water hopper at every third shelter. Another convenience is a "service house" which contains a large central room in which are several writing tables. It has a free telephone and several shower baths and is provided with comfort facilities. A register on a writing shelf near the entrance invites the signatures of those who use the park. It is ruled to carry entries showing the names of the members of each party, and the destination and make of car. There is a column for criticism or suggestions offered.

One thousand eight hundred and sixty-seven motor parties from nearly three hundred cities, registered at this park last season. Uniformly favorable comment by these visitors on Marysville's thoughtfulness to her guests is an indication of appreciation. Occasionally a constructive criticism has been written in the register, and the Marysville Chamber of Commerce has capitalized several practical suggestions.

Trees, shrubbery and flowers lend beauty to the surroundings. The plan for the park follows suggestions made by Professor J. W. Gregg, of the University of California. The roadways are of gravel. A gardener, with police authority, is in attendance. His service is paid for by the city. The park is electrically lighted.

For those cities which are contemplating plans for a motor park, the means of promotion used in Marysville may be interesting. A full city block was given by the city and the county. Local organizations, among which the Chamber of Commerce was prominent, contributed to its support. The Women's Civic Improvement League gave financial assistance toward a fund for shrubbery and trees. Material used in the construction of shelters and the service house was provided by local dealers at cost, and labor was contributed by labor unions. The total amount expended upon equipment was $2,500.

So satisfied are the people of Marysville that this park is a practical asset to the community, that a score of additional shelter houses will be constructed. Swings for children will be put in place, and a tennis court is to be laid out.

Leading merchants in Marysville have admitted that there have been practical returns to them from the advertising directory which appears upon the walls of the service house.

In the wonderfully rich and fertile valley of the Sacramento, motorists bound on long trips have been for some time in evidence. Roads are good, weather is pleasant, and the scenery of northern California affords a constant succession of surprises. Not far from the city are the Marysville Buttes, something of a curiosity from a geological standpoint; not far distant are Oroville and Grass Valley and other places associated with Bret Harte's stories of the gold-crazed days of a little more than half a century ago. Travelers in this region find many things to interest them. Some are enroute to Lake Tahoe, others to see Lassen's smoking peak and Mt. Shasta's snow-capped summit. From whatever direction they come, sojourners in the Marysville auto park have words of praise for the city that has planned with a view to the comfort of its itinerant motoring guests.

Auto Parks in Other Western Cities

Several cities in Montana maintain auto parks. Bozeman has had one for three years, containing a two-room service building. Missoula is just finishing a new park for travelers, equipped with stoves, benches and telephone service. Helena's records show that 10,981 cars stopped at its auto park last season.

The state of Washington contains a number of new camping grounds. Spokane has just opened one near Coeur d'Alene Park; it has shower baths for men and women, electric lights, slot-meter gas stoves, open hearths, and other provisions for comfort. Walla Walla has a 7-acre tourist park, and Ellensburg has purchased 30 acres for the purpose. Pasco takes care of tourists in a park opposite its court house. Yakima maintains a camp in the state fair grounds.

"How To Get A Good Water Supply"

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Conducted by A. L. H. Street, Attorney at Law

Powers of City Councils

A decision of the South Carolina Supreme Court holds that, subject to constitutional and charter limitations, it is the business of a city council, and not the privilege of citizens, to determine what is best to be done with regard to municipal affairs. The discretion is vested in the council by law, and that body is not to be controlled in its exercise by the citizens—and not even by the courts—provided that the council action is within the law; and it will always be assumed that the council has acted within its authority until the contrary is made to appear.

But when the council does exceed its authority by acting in violation of a valid statute, or in pursuance of an unconstitutional one, every person dealing with the city under such excess of authority does so at his own risk. And, finding that the city council in this case did exceed its authority, by acting under a void statute, the court holds that, a statute purporting to authorize a city to issue bonds for the purchase of fire apparatus, thereby increasing the bonded indebtedness of the municipality without a vote of the people in violation of the state constitution, being void, a taxpayer was entitled to enjoin issuance of such bonds. (Stone vs. City Council of City of Greenville, 102 Southwestern Reporter, 755.)

Control of Street Car Fares

The authority in the Railroad Commissioners of the State of Florida to prescribe street car fares for the Pensacola Electric Company is sustained by the Florida Supreme Court in the case of State vs. Railroad Commissioners, 84 Southern Reporter, 444. It is decided that a statute of the state which gives to the Railroad Commissioners authority "to make reasonable and just rates of freight and passenger tariffs to be observed by all railroads, railroad companies and common carriers doing business in this state," comprehends street railroads.

In the course of its opinion the Court says:

"Independently of a right to regulate and control the rates to be charged for public service reserved in a grant of a franchise or right to use the city streets, a city or other municipality has no power to regulate the rates to be charged by public service corporations in the absence of express or plain legislative authority to do so. Nor does such authority arise from the power to regulate the opening and use of streets, nor from a grant of the general right to control and regulate the right to erect works in the streets of the city.

"Where it is doubtful whether a statute authorizes a municipality to fix rates for a public utility company, such doubt must be resolved against the authority of the city.

"Even if authority is by statute given to a municipality to fix rates for a public service corporation operating therein, such authority is subject to legislative control.

"Any contract ordinance passed by the city with statutory authority fixing by agreement street car fares, as an incident to the granting of franchises to a street railroad company, is subject to legislative control."

Mistaken Assessment Computations

A city council's record of proceedings taken in the establishment of a drainage district must be taken as the only evidence of such proceedings until and unless corrected or amended by appropriate procedure. The fact of the establishment of a district and its identity can be judicially ascertained only through such records.

The fact that an assessment of benefits on account of the establishment of a drainage district may have been rested on a false basis, or upon a mistaken computation, will not warrant the setting aside of the assess-

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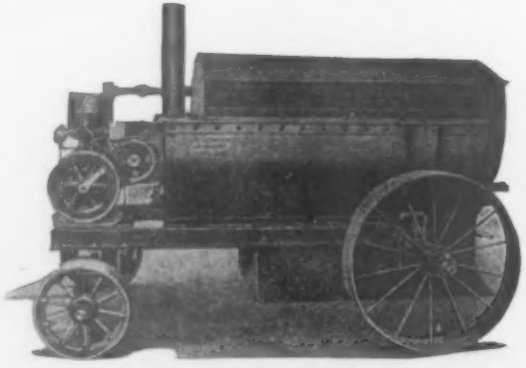

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ment, if it appears that the amount assessed does not exceed a just amount. (Iowa Supreme Court, Appeal of McLain, 176 Northwestern Reporter, 817.)

License Taxes Against Auctioneers

An ordinance of the town of Hendersonville, N. C., specifies among the privilege taxes levied upon the business, trades, and professions operated within the city of Hendersonville, that "every person, firm or corporation engaged in the business of selling any kind of merchandise, at auction, within the corporate limits of the city of Hendersonville, whether said business is conducted within or without buildings, shall pay a license or privilege tax of $400." This regulation is upheld by the North Carolina Supreme Court in the case of State vs. Razook, 103 Southeastern Reporter, 67, in which it is decided that although the municipality was not empowered to place a license or occupation tax so high as to amount to a prohibition of doing business, it cannot be said that $400 was an unreasonably high fee. And it is further decided that the ordinance was not invalid as being discriminatory merely because there was only one person in town whose principal business was that of auctioning goods, nor because the ordinance excepts a person selling his own goods not more than one day in six months. Incidentally it is declared that one prosecuted under a city ordinance of which he had personal notice served upon him, cannot complain that it was not printed and published as required by city charter.

What Constitutes "Public Utilities"

A section of the Oklahoma constitution reads:

"Any incorporated city or town in this state may, by a majority of the qualified property tax-paying voters of such city or town, voting at an election to be held for that purpose, be allowed to become indebted in a larger amount than that specified in section twenty-six, for the purpose of purchasing or constructing public utilities, or for repairing the same, to be owned exclusively by such city."

Interpreting this provision in the case of Denton vs. City of Sapulpa, 189 Pacific Reporter, 532, the Oklahoma Supreme Court holds that the words "public utilities" embrace a cemetery to be acquired and controlled by a city and open to use by the public under reasonable regulations for the burial of the dead.

In the course of its opinion the Court says:

"This court has had frequent occasion to consider the meaning of the words 'public utilities,' and to decide what constitutes a public utility within the meaning of the provisions of the constitution; this court having held that such public conveniences and necessities as sewers, a convention hall, public parks, and fire stations and equipment came within the embrace of the term 'public utilities.' * * * These cases indicate the weight and consideration given by this court to the elements of public safety, health, comfort, and public control, as such elements may affect and determine whether such utilities constitute a public utility; but this court has also defined these words in a more general sense, as is stated in State ex rel. Manhattan Const. Co., v. Barnes, supra, where it is said:

"'The term "public utility," as used in this section of the constitution, was before this court for construction in State v. Miller, 21 Okl. 448, 96 Pac. 747. In that case it was held that sewers are public utilities, within the meaning of the term as used in the constitution, and Valley City Salt Co. v. Brown, 7 W. Va. 191, in which the term "public utility" is construed as being synonymous with "public use," was cited with approval.'

"The meaning of the term 'public use' is then given careful consideration. Accepting this application of the words 'public utility' we are not without authority, for it was said in Evergreen Cemetery Association v. City of New Haven, 43 Conn. 234, 21 Am. Rep. 643:

"'The use of land for a burying ground is a public use, and, for such a purpose, it may be taken, if need be, under the right of eminent domain.'"

Unreasonable Water Pipe Assessments

While the necessity, character and extent of a public improvement are committed to the judgment of a city council, it is a question for determination by a court as to whether that judgment has been exercised in a reasonable manner, and if, in view of the circumstances and surrounding conditions, the ordinance is unreasonable, unjust and oppressive, it is the duty of the court to declare it void. Hence it is held that an ordinance of the city of Chicago ordering the construction of a water-supply pipe on an isolated street in a sparsely populated district without access to industries or con-

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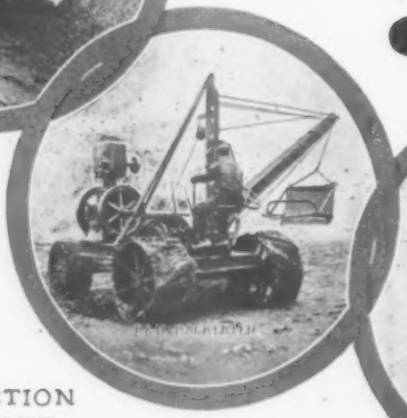

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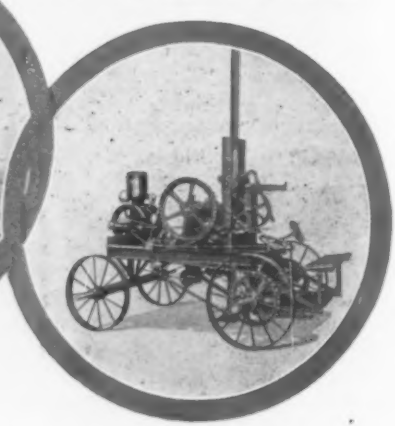

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venient transportation, largely at the expense of vacant property not in demand, and for which no demand will be created by the construction of the improvement until there is a prospect of better facilities for transportation, is unreasonable and oppressive. (Illinois Supreme Court, City of Chicago vs. Municipal Engineering & Contracting Co., 127 Northeastern Reporter, 65.)

Municipal Milk Regulation Upheld

An ordinance of the city of Charlotte, N. C., the validity of which is upheld in the recent case of State vs. Kirkpatrick, 103 Southeastern Reporter, 65, provides:

"No person, firm or corporation shall engage in the sale, handling or distribution or production of milk for sale in the city of Charlotte, nor shall any person ship any milk into the city of Charlotte, until he has obtained a permit therefor from the health authorities of said city. This permit shall be renewed on or before the first day of July in each year, and may be suspended or revoked at any time for cause. Each person applying for a permit shall pay to the city tax collector the sum of $1 for each renewal thereof."

The Supreme Court holds that the regulation is not invalid by reason of its containing no provision for an appeal from any action of the health authorities, since if there is any arbitrary action it may be shown as defense on an indictment, or on application for mandamus, or in an action for damages.

It is further held that the ordinance, requiring people selling milk to obtain a permit and pay license fee, but providing that nothing should be construed to prevent the owner of two cows from disposing of his surplus milk, "provided such milk is not peddled or vended," and that a provision in the ordinance subjecting a party violating it to a penalty of $10 should not apply to any person owning not more than two cows, was not discriminatory, since the owner of not more than two cows would have to pay a license fee if he sold milk.

And it is also decided that one who has never applied for a permit has no standing to complain of on arbitrary power of the health authorities under such ordinance.

Electric Franchise Not Exclusive

A grant of the right to use the streets of a town for the distribution of electric current was not rendered exclusive by a provision therein that the town thereby warranted that it would provide for the full and free use of its streets, lanes, etc. Grants of rights and privileges by a state or municipality are strictly construed, and whatever is not unequivocally granted is withheld, nothing passing by implication. (United States Supreme Court, Piedmont Power & Light Company vs. Town of Graham, 40 Supreme Court Reporter, 453.)

Municipality's Liability for Personal Injury

An employe in charge of a municipal electric power plant was without authority to invite persons to enter the premises for purposes personal to himself, and therefore the municipality is not liable for injuries sustained by such an invitee on account of any dangerous condition existing in the plant.

A village is under no obligation to keep its power plant in a safe condition for the benefit of trespassers, intruders, idlers, bare licensees, or others who go upon the premises, not by invitation express or implied, but for their own purposes and pleasure or to gratify their curiosity, howsoever innocent or laudable their purpose may be, and whether children or adults. (Vermont Supreme Court, Coburn vs. Village of Swanton, 109 Atlantic Reporter 854.)

Street Railroad Franchise Interpreted

A street railroad franchise authorizing the construction of necessary side tracks, turnouts, and switches, when construed, as it must be, strictly against the grantee, does not authorize the construction of a loop. A street railroad franchise authorizing the occupation of certain streets and no other, among them a street from Grandview Avenue to a destination, does not give any right to occupy Grandview Avenue; "from," as a general rule, excluding the terminus referred to. (Iowa Supreme Court, City of Dubuque vs. Dubuque Electric Company, 177 Northwestern Reporter, 700.)

Trading Stamp Ordinances

An ordinance, prohibiting the issuance of trading stamps, profit-sharing coupons, and gifts of like character in connection

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FLUSHING and SPRINKLING UNITS

Forty feet from curb to curb—sand filled brick pavement—cleaned in one trip with three nozzles.

The machine has four nozzles which can be used discharging one, two or three flushing streams at the same time.

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with the advertisement and sale of goods, is void. (Colorado Supreme Court, City and County of Denver vs. United Cigar Stores Co., 189 Pacific Reporter, 848.)

Restricting Undertakers' Locations

In a decision handed down June 11, in the case of City of St. Paul vs. Kessler et al., the Minnesota Supreme Court holds that undertaking establishments and so-called funeral homes may properly be held a nuisance in districts of a city occupied exclusively for residences, and an ordinance prohibiting them therein is valid, provided the city has been granted the authority to restrict or prohibit nuisances. The opinion further holds that the St. Paul charter confers such authority, by granting power "to define, regulate and abate nuisances," and "to regulate the location of stockyards, slaughter-houses, rendering plants, soap factories, tanneries, stables, privies, and other unwholesome or nauseous houses or places."

The Court adds that the general welfare clause of a municipal charter empowers cities to "prescribe districts within which no business or occupation of a noxious or offensive character or which tends to interfere with the comfort and prosperity of others may be carried on."

Status of Municipal Water Plants

Under the public service corporations law of Pennsylvania the State Public Service Commission has no jurisdiction to determine the reasonableness of water rates charged by a city.

"When rendering the same character of service as public service companies, municipalities for many purposes must be considered and treated like private corporations * * *, but, for the purposes of supervision over their internal management * * * it can readily be seen they may justifiably be put on a different basis from ordinary public service companies, for, though engaged in rendering the same kind of service as the latter, and entitled to derive therefrom a just gain * * *, municipalities are supposed to act primarily for the public good—not to earn dividends. Moreover, they are financed along quite different lines from other corporations, and managed by popularly elected officers, who, as just said, are presumed to act for the public weal, and when they fail to do so, may be turned out by their constituents at stated intervals. These considerations, with others which may readily be called to mind, account for and justify the omission of municipal corporations from the general application of our Public Service Company Act."

But under the statutes of Pennsylvania a court of equity has jurisdiction to adjudicate a complaint of a consumer that a city operating a water plant is enforcing unreasonable and discriminatory rates to his prejudice.

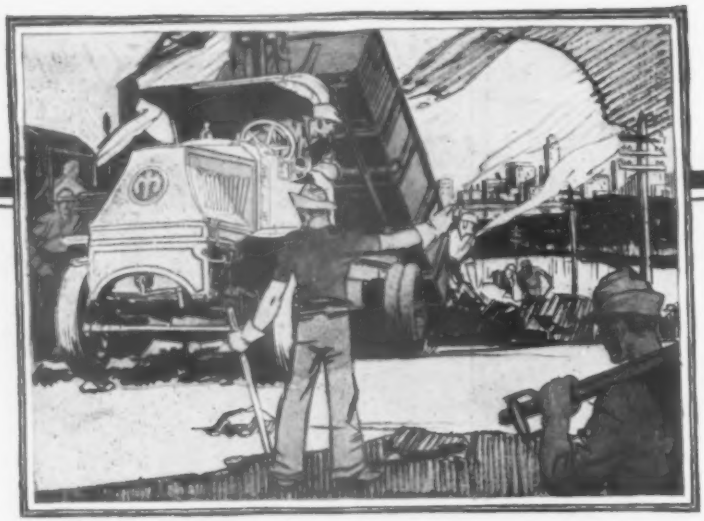
And a statute purporting to empower a city to give unfair preferences or to make unfair discrimination between customers would be unconstitutional as depriving citizens of property without due process of law.

"While, necessarily, a wide range of discretion is allowed municipal authorities in fixing public service rates * * *, and classification of users is permitted * * *, yet a city operating a legalized monopoly, in the nature of a water plant, cannot give undue or unreasonable preference or advantage to, or make unfair discrimination among, customers, any more than a private corporation similarly situated."

Where a municipal water-works plant enjoys a monopoly of the business of supplying water to the inhabitants of a city, a consumer will not be estopped to sue to determine the reasonableness of rates, asserted by him to be excessive or discriminatory, through his continuing use of and payment for water. (Pennsylvania Supreme Court, Barnes Laundry Co. vs. City of Pittsburgh, 109 Atlantic Reporter, 535.)

Taxicab Stand Locations

It is within the powers of a city to abolish a particular street stand for vehicles operated for hire, although the same may have been established by prior ordinance, unless it appears that the city authorities are acting unreasonably in abolishing the location. "The creation of stands of this character and their abolition is largely discretionary with the city council. What may operate at one time to create the stand may be not proper at another time." (Texas Court of Criminal Appeals, Ex parte Stallcups, 220 Southwestern Reporter, 547.)



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Municipal and Civic Publications

WATER PURIFICATION PLANTS AND THEIR OPERATION.

Milton F. Stein, Member Am. Soc. C. E. Second edition. John Wiley & Sons, Inc. 1919. X + 269 pp. Illustrated.

The first edition of this valuable book for waterworks operators met with such unqualified success that a second edition, involving a few changes, is welcomed. This edition contains material changes only in two chapters, namely, those covering the bacteriological testing of water and the interpretation of chemical, physical and bacteriological tests. For those who do not know this book well a review of the chapter headings will be of value: Water and Its Impurities, Types of Purification Plants, Physical and Chemical Tests, Bacteriological Testing of Water, Interpretation of Tests, Coagulation and Sterilization, Water Softening, Sedimentation, Filtration, and General Operation.

MODERN ROADS.

H. Percy Boulnois, Past President, Institute of Municipal and County Engineers. Edward Arnold, Publisher, London. 1919. VII + 302 pp. Illustrated.

An interesting discussion of modern road problems from the English standpoint, covering the questions of traffic, construction and maintenance of macadam roads, tar treatment of road surfaces, bituminous roads, bituminous carpets, waves and corrugations, paved streets, concrete roads, and schemes for preventing skidding on streets. Of particular interest to American engineers is the discussion of the Teddington road testing machine used for measuring the wear on roads, with graphs of road surfaces before and after testing.

ENGINEERING FOR LAND DRAINAGE.

Charles G. Elliott, Consulting Drainage Engineer, U. S. Department of Agriculture. Third edition. Revised. John Wiley & Sons, Inc. 1919. XIII + 363 pp. Diagrams.

The third edition of this book has been entirely rewritten to embody all knowledge in the development and extension of land drainage which has taken place in the last twenty-five years. The book discusses the development of land drainage both in Europe and the United States, and outlines the qualifications and work of the drainage engineer and the technique which he must follow, methods of drainage, including the preliminary surveys, underdrains and their location, the flow in underdrains, the run-off from underdrained areas, and the necessary sizes of tile-drains and their selection and construction. In addition, the questions of flow in open channels and the run-off from large areas are analyzed. The final chapters deal with the subject of the location and construction of open ditches and their problems, the laying out of drainage districts and levee drainage systems, the reclamation of tidal lands and the drainage of irrigated lands, the drainage of peat and muck lands, the control of hill waters, the drainage of home surroundings, and the all-important subject of estimates and accounts.

EMPLOYMENT STANDARDIZATION IN PUBLIC SERVICE.

William C. Beyer, Assistant Director, Bureau of Municipal Research of Philadelphia. Supplement to the "National Municipal Review." National Municipal League, Concord, N. H., June, 1920. 12 pp.

This pamphlet analyzes the problem of compensation for public service, including the phases of equal pay for equal work, and the adjustment of scales with reference, (a) to compensation for similar work in private employ, and (b) to a figure estimated to represent the cost of living for individual or family. The problem of selection for promotion is also considered, with a brief and rather discouraging allusion to the system of "efficiency records" with which Chicago and other cities have experimented.

SHANGHAI MUNICIPAL COUNCIL.

Report for the Year 1919, and Budget for the Year 1920. 8 by 13 inches. 276, 55, 122 pp. Views, tables, diagrams.

HIGHWAYS GREEN BOOK.

American Automobile Association, Riggs Building, Washington, D. C., 1920. 525 pp. Illustrated.

This very complete and useful book is an encyclopedia of information on national, state and local highway legislation, development, construction and maintenance. Many of the chapters were prepared or revised by the leading highway authorities of the United States and Canada. This book will be particularly valuable to those who have to do with molding public sentiment for better roads, and to legislators whose duty it is to determine matters of public policy and to frame adequate laws relating to motor vehicle taxation, registration and regulation, highway financing, management, construction and maintenance. The book is issued as an annual by the Good Roads Board of the American Automobile Association.

THE EMPIRE MUNICIPAL DIRECTORY AND YEAR BOOK, 1920-1921.

Sanitary Publishing Company, Ltd., London, England. 1920. III + 268 pp.

A complete directory of municipal, highway, water, sewerage and lighting engineers, fire brigade officers, street cleaning superintendents and health superintendents of the British Empire. This book is of particular value to municipal officials and associations in the United States desiring to communicate with officials in the countries making up the British Empire. The current issue includes a lengthy section on roads and road making, and reinforced concrete road systems, and a complete list of books on road construction and maintenance, water-supplies, water purification and softening, sewerage and sewage disposal and municipal legislation in Great Britain, a list of books on meat and food inspection, and a section on town planning.

ORGANIZATION OF PUBLIC HEALTH NURSING.

Annie M. Brainard. The Macmillan Company. 1919. XII + 44 pp. Diagrams.

This small volume is one of an interesting series of public health nursing handbooks, which have already covered industrial nursing and sanitation for public health nurses. The present volume brings out the need of organization, the fundamental principles and forms of organization, the nurse's part in organizing public health work and how such work should be instituted in a new community, the functions of boards of directors and committees of finance, the necessity and usefulness of a committee on nurses, the supply committee, and the value of records and statistics. The concluding chapter discusses the need of reorganization in some communities, and methods by which it may be brought about.

THE HOUSING SITUATION IN ENGLAND AND THE UNITED STATES.

F. T. Miller, President, F. W. Dodge Company. Published by the F. W. Dodge Company, 119 West 40th Street, New York City. 1920. 32 pp.

This pamphlet describes the present housing conditions, analyzes the causes of the shortage of houses, and explains the measures of relief that have been adopted and their results. It traces the cause of the present shortage back to scarcity of production due to lack of proper economic and moral incentive for the exertion of energy by workers, and maintains that "legislation promoting wider ownership of property can alone call forth the energy necessary for the maximum of production."

THE PRINCIPLES OF SOCIOLOGY.

Edward Alsworth Ross, Ph.D., LL.D., Professor of Sociology, University of Wisconsin. The Century Co., New York. 1920. XXVIII. 708 pp.

REPORT OF THE NEW YORK STATE BRIDGE AND TUNNEL COMMISSION.

The 1920 report to the Governor and Legislature of the State of New York. Views, tables, drawings. Quarto. 82 pp.

COMMON SENSE AND LABOUR.

Samuel Crowther. Doubleday, Page & Company, Garden City, N. Y., 1920. 284 pp.

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THE PORT OF NEW YORK.
Thomas E. Rush, Surveyor of the Port. Doubleday, Page & Company, Garden City, N. Y. 1920. XXV. 361 pp. Illustrated.

ELECTRIC RAILWAYS. (CENSUS OF ELECTRICAL INDUSTRIES, 1917.)
Bureau of the Census, Washington, D. C. Quarto. 177 pp.

ANNUAL REPORT OF THE NEW YORK STATE TAX COMMISSION, 1918.
Legislative Document No. 115. 1919. 531 pp.

STANDARDS OF WEIGHTS AND MEASURES.
Report of the Twelfth Annual Conference on Weights and Measures of the United States, held at the Bureau of Standards, Washington, D. C., May 21-24, 1919. 224 pp. Diagrams. (Apply to the Government Printing Office.)

HOUSING IN NORWAY.
"An Example of Town Planning in Norway: Notes on the Development of Trondhjem," by Sverre Pedersen, Town Architect, Trondhjem. A 12-page illustrated reprint from the March, 1920, issue of the **Garden Cities and Town Planning Magazine**, giving an interesting account of the local housing history and present conditions, and the plans for the expansion of the town. The municipal factory for the manufacture of wooden houses is a feature of this work. Also reprinted from the same issue, "Housing in Norway," by Christian Gerloff, Secretary-General of the Norwegian Housing and Town Planning Association; 8 pp., illustrated, outlining the prevailing plan of municipal house building and the endeavor to form public utility societies—or "building-municipalities"— for the sole purpose of building and letting houses; containing a view and description of a row of experimental houses in Trondhjem, built of different materials, with a view to testing the qualities of each. (Apply to The International Garden Cities and Town Planning Association, 3, Gray's Inn Place, Gray's Inn, London, W. C. 1.)

ELECTRIC DRIVEN WATER WORKS IN INDIANA.
"The Application of Electric Motive Power to Small Water Works Plants in Indiana." By D. D. Ewing, Professor of Electrical Engineering, and G. C. Blalock, Instructor in Electrical Engineering, Purdue University, December, 1919. Bulletin No. 4 of the Engineering Experiment Station, December, 1919. 100 pp. Views, tables and diagrams. (Apply to the Engineering Experiment Station, Purdue University, Lafayette, Ind.)

COMMERCIAL HANNDBOOK OF CHINA.
By Julean Arnold, Commercial Attaché, and various American consular officers and Chinese and American contributors. In 2 volumes. Miscellaneous Series No. 84 of the U. S. Bureau of Foreign and Domestic Commerce, 1920. 629 and 470 pp. Maps, views, tables. (Apply to the Government Printing Office.)

HOME BUILDING FOR WAGE EARNERS.
An analysis of the present financial and economic problem of supplying homes for workers. It discusses proper rents, the advantages of home owning, the guarantee of repurchase by the employer, the financing of building undertakings by Loan Associations, Mortgage Finance Corporations, and Consolidated and Individual Realty Companies, methods of selling, and co-partnership housing. Village planning, types of houses and their essentials are also touched upon. The appendix contains many forms for use by employers in selling or renting to employes. (Apply to Fred T. Ley & Co., Inc., 50 Central Park West, New York City.)

INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.
Proceedings of the Forty-Seventh Annual Convention of the Association, held in Kansas City, Mo., June 24-27, 1919. Illustrated. 334 pp. (Published by the Secretary, James McFall, General Fire Marshal, Emergency Fleet Corporation, United States Shipping Board, Philadelphia, Pa.)

TOWN PLANNING PAPERS AND DISCUSSION.
"Town Planning with Reference to Factory Development and the Distribution of Goods," by W. H. Gaunt, read at the March 5, 1920, meeting of the Town Planning Institute; Town Planning Reports and the Graphic Representation of Statistics," by Major George B. Ford, read at the meeting of the Institute on April 6, 1920. Each with the discussion thereon. Quarto. (Published by the Town Planning Institute, 4, Arundel Street, London, W. C., England.)

SEWAGE DISPOSAL.
Public Health Bulletin No. 101, issued December, 1919, by the U. S. Public Health Service. Containing "Studies of Methods for the Treatment and Disposal of Sewage," made under the supervision of Earle B. Phelps, Professor of Chemistry, U. S. Public Health Service; and "The Treatment of Sewage from Single Houses and Small Communities," by Leslie C. Frank, Associate Sanitary Engineer, and C. P. Rhynus, Assistant Sanitary Engineer, U. S. Public Health Service. Prepared by direction of the Surgeon General. 117 pp. Illustrated. (Apply to the Government Printing Office.)

RECREATION SUGGESTIONS.
Three pamphlets published by Community Service (Incorporated), 1 Madison Avenue, New York City, the first one in coöperation with the Playground and Recreation Association of America: "Community Recreation." December, 1919, 122 pp., containing suggestions for recreation boards, superintendents of recreation, and community recreation workers; "Comrades in Play." February, 1920, 84 pp., describing leisure-time activities which the young men and young women of America can enjoy together; "Summer Camps, Municipal and Industrial." June, 1920, 43 pp. Each one of handy size and full of practical, detailed information.

NATIONAL COMMISSION OF FINE ARTS REPORT.
Containing a review of the progress made in carrying out the plan of Washington prepared in 1901 under the direction of the late Senator McMillan by the commission composed of Messrs. Burnham, Mc-Kim, Saint-Gaudens, and Olmsted, and outlining the work to be done in the immediate future for the development of the National Capital. Including also material on the improvement of Army and Navy medals and insignia, a discussion of the plans for American cemeteries in France, and advice to persons interested in erecting war memorials. There is a chapter on the memorials now being erected in Washington. 148 pp. and 70 illustrations, including a full set of pictures of the Lincoln Memorial. (Apply to the Government Printing Office.)

TRANSACTIONS OF THE OKLAHOMA SOCIETY OF ENGINEERS.
Report of the meeting held October 28, 1919, in Oklahoma City. 73 pp. Illustrated. Containing a map showing the surface water-supplies and sewerage systems of the state of Oklahoma. Among the papers presented, especial attention is called to the following: "Sewage Disposal," by V. V. Long, consulting engineer, of Oklahoma City; "Tissue Paper Roads," by R. E. Brownell, Highway Engineer, Portland Cement Association; "The Municipal Problem as a Unit," by Alfred Boyd, Dean of Engineering, A. & M. College, Stillwater; "Procedure in Grade Crossing Elimination," by A. I. Thompson, Engineer State Corporation Commission. Edited by the Secretary. (Apply to H. V. Hinckley, Secretary-Treasurer, 1018 North Harvey Street, Oklahoma City, Okla.)

PLAY DAYS IN RURAL SCHOOLS.
By C. J. Galpin and Eleanore Weisman. 20 pp. Published and distributed by the Agricultural Extension Service, College of Agriculture of the University of Wisconsin, K. L. Hatch, Assistant Director, the United States Department of Agriculture coöperating. Giving specific directions for making rural community play days delightfully interesting and stimulating. (Apply to the Extension Service of the College of Agriculture, The University of Wisconsin, Madison, Wis., for Circular 118, published September, 1919.)

Municipal Reports

Buffalo, N. Y.—Eighth Annual Report of the Children's Court. 1919. (Apply to George E. Judge, Judge of the Children's Court.)

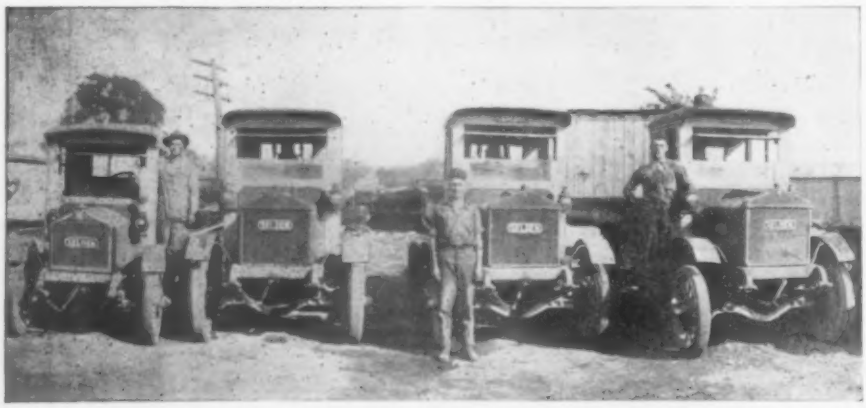
Greeley, Colo.—Annual Report of the Water Department for 1919. (Apply to Milton Seaman, Superintendent.)

Johnstown, N. Y.—42d Annual Report of the Board of Water Commissioners. Filed with the City Clerk, January 20, 1920. (Apply to Grover E. Yerdon, City Clerk.)

Minneapolis, Minn.—Thirty-seventh Annual Report of the Board of Park Commissioners. 1919. (Apply to Theodore Wirth, Superintendent.)

Port Arthur, Texas.—Second Annual Report of the Engineering Department. March 31, 1920. (Apply to Clarence E. Ridley, City Engineer.)

Washington, D. C.—Report of the Collector of Taxes of the District of Columbia for the fiscal year ended June 30, 1919. (Apply to the Government Printing Office.)



Selden Trucks Make a Record on Toledo-Buffalo Road

WITH the aid of ten SELDEN Trucks, twelve miles of monolithic brick paving were laid on the Toledo-Buffalo road, between Ashtabula and Conneaut, Ohio, in the record time of ninety-two days. And this road is pronounced by State and National Highway officials to be one of the finest in America.

Nearly two thousand carloads of materials, including six million paving bricks, were used in the construction of this half a million dollar road—the majority of which was hauled by ten SELDEN Trucks. The average haul was 2½ miles and an average of 100,000 bricks was hauled daily.

"Working alongside of four other leading makes of trucks, my SELDEN Trucks gave far better satisfaction," says Thomas P. Fitzgerald, the contractor.

Similar reports of highly efficient performances of Selden Trucks are given by contractors and municipal officials in all parts of the country.

The Magazine "TRUCK TRANSPORTATION" will be mailed free to all interested upon receipt of request to Dept. AC
SELDEN TRUCK CORPORATION
Rochester, N.Y.

Ship by Truck —SELDEN Truck

1½, 2½, 3½, 5 Ton Models—All WORM Drive

Selden Trucks

SELDEN TRUCK CORPORATION, Rochester, N. Y., U. S. A.

Methods, Materials and Appliances

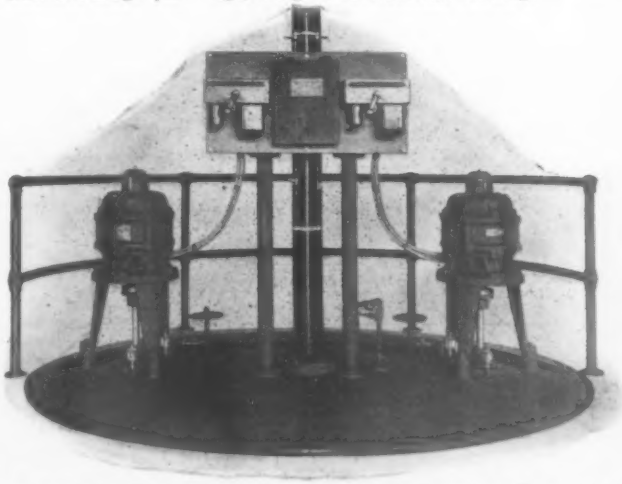
News for Boards of Public Works, Engineers, Contractors, Purchasing Agents, and Others Interested in the Economical Construction and Efficient Operation of Public Improvement Undertakings

An Electric Sewage Pumping Station

The ready and dependable removal of sewage from drainage sumps in the low sections of cities is essential to prevent the backing up of liquid waste in basements. In order to care for such situations, Yeomans Brothers Company, 1417 Dayton Street, Chicago, Ill., has developed the Duplex electric centrifugal sewage ejectors. The sewage receiver into which the flow from the sewerage system runs consists of a cast iron cylinder with bowl-shaped bottom, so shaped to prevent the accumulation of solids. The centrifugal pumps used are of the bottom-suction, vertical, open-impeller, centrifugal type with forced-feed, lubricated, split, babbitted thrust bearings and bronze-covered shafts. The motors, which are mounted on the floor above the pumps, are of the vertical-shaft, semi-enclosed, slow-speed type with the thrust bearings in the upper heads. Each ejector is supplied with a float-operated alarm which rings a bell if the water level in the receiver rises above the point at which the pumps are set to start. This alarm float is independent of the controller float which operates the pump. The discharge connections of each pump are equipped with bronze-fitted, horizontal-swing check valve with renewable seat and extended-hinge pin with external lever, so that the valve can be opened for flushing back through the pump and the operation of the check valve can be observed at all times. Gate valves are provided in each unit between check valve and riser to street sewer. All connections from the pumps to the double-branch connection in the riser are made with flanged, long-turn fittings and are supported by a pipe standard mounted on the base of the receiver. A cast-iron bar screen 36 inches in diameter is provided in the receiver just below the inlets. This screen is of such mesh that it will pass paper and soil but will intercept heavy or unusual obstructions which may come through the drains. It is made in sections and can be easily cleaned, without taking it out, through the manhole in the receiver wall. These ejectors are usually installed in a circular pit of suitable dimensions, consisting of a steel shell embedded in concrete. If preferred, the ejector may be installed in a concrete pit without the steel shell, and the pit may be round, elliptical, or rectangular, as local conditions demand.

Consoer Joins Older & Quinlan

The engineering practice of Older & Quinlan, consulting engineers, 1654 Monadnock Block, Chicago, Ill., has been merged with the practice of Arthur W. Consoer under the corporate name of the Consoer Engineering Company, with executive offices at the above address. Clifford Older is President of the company, George A. Quinlan, Secretary and Treasurer, and Arthur W. Consoer, Vice-President and Business Manager. This firm will engage in the practice of consulting engineering in municipal paving, sewerage, water-supply, drainage, bridges and industrial building.



A SEWAGE PUMPING UNIT FOR LOW DISTRICTS OR LARGE BUILDINGS

A Modern Lighting System

does *not* require separate Lamp Standards as this street scene clearly shows.

Missoula, Montana, is one progressive western city utilizing "ELRECO" Combination Railway and Lighting Poles, which makes separate Lamp Standards unnecessary.

The "ELRECO" Steel Poles support ornamental lighting brackets with modern General Electric Lighting units; also, the span and service wires of the Railway and Lighting Company; keep the streets free and unobstructed from extra Lamp Standards, wooden poles, and a multiplicity of wires, etc.

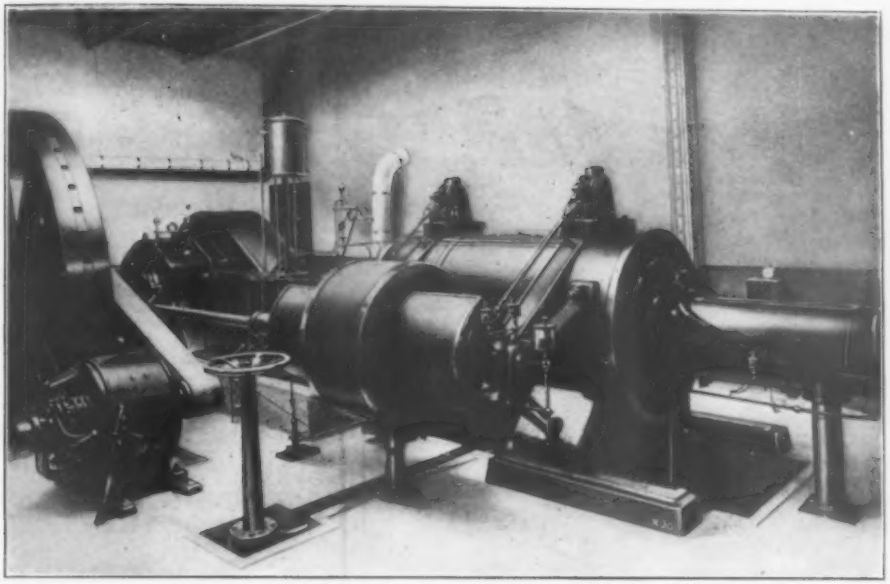
The usual practice of financing such an installation is to divide the cost between the local Street Railway and Lighting Company, Merchants and the City, making the cost of "WHITE WAY" very reasonable.

What other progressive cities have accomplished is well illustrated in our handsome Catalog "F", sent on request to those interested.

Electric Railway Equipment Company

CINCINNATI, OHIO.

New York Office—30 Church Street



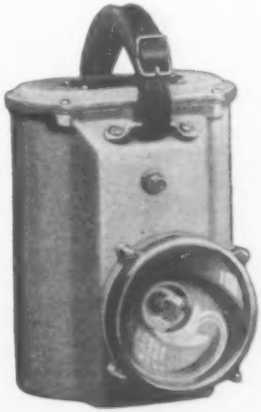
THE NEW 600-H. P. ENGINE RECENTLY INSTALLED AT PORT WASHINGTON, WIS.

Addition to Municipal Power Plant, Port Washington, Wis.

One of the interesting features of the manufacturing city of Port Washington, Wis., is the municipal water and lighting plant, enlarged last year much to the benefit of the city. A new 600-h.p. Uniflow engine, made by the Nordberg Manufacturing Company, Milwaukee, Wis., and a new General Electric generator were installed at a cost of $35,000. This enlarged the plant so that it now includes three Nordberg engines, two Corliss type and one Uniflow type which can carry a 1,200-h.p. load, making it one of the best-equipped municipal water and light plants in Wisconsin. The plant is on a sound financial basis and is making money for the city.

Hand Electric Search-Lights for Emergency Service

There is scarcely a municipal department where a powerful electric hand light will not be found of use, particularly in fire and police departments, whose protective work takes them through smoke, fog, steam and chemical vapors. Also water-works departments where leaks must be sought out in dark cellars or at night along gloomy streets, find them of great service. It is for such work as this that the Grether Manufacturing Company, Dayton, Ohio, manufactures a hand search-light such as is illustrated herewith, which will throw a powerful ray of light from 350 to 400 feet. This search-light has exceptional brilliancy and penetrating force. Smoke, water, vapor, steam, and chemical fumes do not affect the operating efficiency of the search-lights, which is the reason that they are used so extensively by firemen, police and others engaged in emergency or rescue work. The actual burning capacity of the light averages 18 hours, but when used for long continuous periods the batteries wear out quicker than when used for short intermittent periods.



A HANDY ELECTRIC SEARCH-LIGHT FOR EMERGENCY WORK IN MUNICIPAL DEPARTMENTS

1 2 3

Concrete Lighting Standards

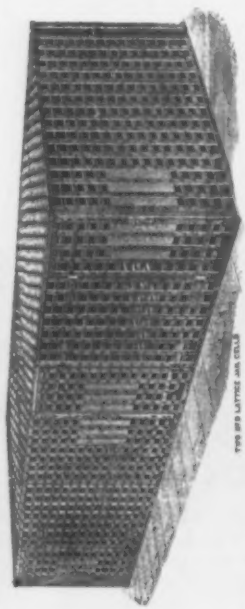
Elegance, Permanence, Utility Combined

1. **THE BOULEVARD** — Height 13′-0″. For Parks, Drives and Boulevards.
2. **THE BROADWAY** — Height 10′-0″. For Business Thoroughfares and Residential Lighting.
3. **THE UTILITY** — Height 7′-0″. For Safety Islands, Entrances to Public Buildings and Ornamental Lighting.

Write for particulars

American Concrete Products Co.
30 N. La Salle St. Chicago, Ill.

STEEL JAIL CELLS AND JAIL WORK



Jail Entrance Doors, Jail Bedsteads, Window Guards, Steel Plate Lining, Stairs, Folding Steel Bunks.

SEND FOR CATALOGUE IF INTERESTED.

E. T. BARNUM IRON WORKS, Detroit, Mich.

The Key to Vigilance

HARDINGE SYSTEM

of

Police Registration

High Efficiency
Low Cost

Write for Book—"Key to Vigilance"
HARDINGE BROTHERS, INC.
4147 E. Ravenswood Ave., Chicago

A TYPICAL DE LAVAL INSTALLATION IN DURHAM, N. C.

High Efficiency in Centrifugal Pumps

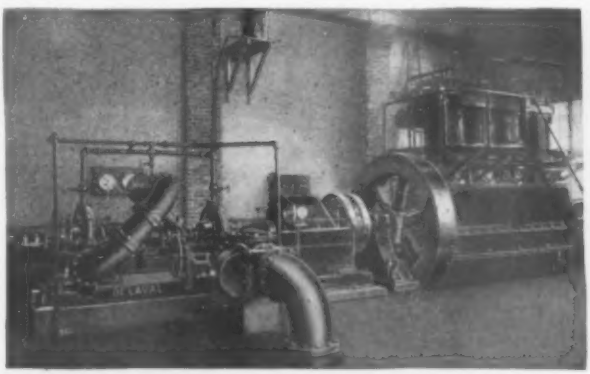
The city of Minneapolis recently made a test of one of its centrifugal pump installations in which the pump showed an over-all efficiency of 86 per cent and in which the over-all efficiency from "wire to water" averaged 82.48 per cent over a period of nine months.

In addition to this interesting installation of De Laval centrifugals, nearly as good results were shown by two 12-inch pumps at the McCarren pumping station of the city of St. Paul. The specifications required that each unit should be guaranteed to deliver not less than 5,000 U. S. gallons per minute against a total head of 171 feet, and not more than 5,500 gallons per minute against a total head of 158 feet, the over-all efficiency from "wire to water" to be not less than 72 per cent when pumping continuously at either of the heads and deliveries.

The bid of the Northwestern Electric Equipment Company of St. Paul was accepted. It offered two centrifugal pumps manufactured by the De Laval Steam Turbine Company, Trenton, N. J., and synchronous motors of the rotating field type, guaranteeing an efficiency of 74.3 per cent at heads of either 158 or 171 feet, and an over-all efficiency of 73.7 per cent at 140 feet. The pumps are of the single-stage, double-suction, volute type, having 12-inch suction and discharge nozzles, with no diffusing vanes. After installation, both units were subjected to very complete tests to determine both efficiency and head-capacity characteristics. Before the official tests were run, the impellers had been turned down slightly in diameter, because the motors were operating at 20 r.p.m. above rated speed. Before beginning the test, the pressure gauge of each pump was taken off and calibrated on a dead weight testing instrument and then replaced, the pump stopped, and the static head of water determined by finding the elevation of the centers of the gauges and the elevation of the water in the high-service reservoir. Numerous other details of this type were carefully gone over to insure the accuracy of the test.

The quantity of water delivered was measured by a 30-inch x 13-inch Venturi meter, supplied by the Builders Iron Foundry, of Providence, R. I. The recording instrument supplied with this meter included an indicating dial, a recording card and an integrating counter, but in order to verify the accuracy of its readings an indicating mercury manometer was also connected to the pressure pipes of the Venturi tubes. In running the test, the head against which the pumps worked was controlled by means of a hydraulic gate valve on the discharge side of the pumps. After throttling the gate valve, no readings were taken until all the instruments had ceased fluctuating, after which two or three readings were taken, and averaged if any variations were found. Observations were made with the pumps operating under four different heads, covering a wide range of delivery. The results obtained from the official tests showed that pump No. 25650 had an over-all efficiency of 78.4 per cent and a pump efficiency of 82.2, operating at a total head of 143.25 feet. When pumping against a head of 185.75 feet, it had an over-all efficiency of 67.7 and a pump efficiency of 71.5 per cent. The tests of pump No. 25651, while slightly lower in pump efficiency and over-all efficiency at the 143-foot head, showed a pump efficiency of 77 per cent and an over-all efficiency of 72.8 per cent when pumping against a total head of 178 feet.

In many places centrifugals are replacing the old triple-expansion reciprocating pumps, particularly where it is necessary to economize space. While the actual per cent efficiency of the centrifugal may be slightly less, the size and the labor costs make up the difference.



THE CLARKSBURG, W. VA., WATER-WORKS ARE WELL KNOWN FOR ECONOMICAL OPERATION

Necessary conservation of coal, because of high price and difficulty in securing ample supply, demands serious consideration

Make every scoopful count by installing G-E Flow Meters

On boilers—they show up careless firing, unequal boiler outputs, dirty tubes, holes in fires, incorrect drafts, etc., all of which waste coal.

On steam lines to departments and processes—they show the amount consumed from which operating costs can be determined as well as leaks, careless operations, etc.

On feed water lines—they show the amount of water delivered to the boilers, from which the evaporation factor can be computed—information of the utmost importance.

All G-E Flow Meters are simple, reliable and accurate, requiring only reasonable care for satisfactory operation.

Write our nearest office for Booklet, "A Guide to Boiler Economy," and Bulletin 46501-C describing G-E Flow Meters for all applications.

General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

[34C-22

Recovering Fibrous Material from Municipal Refuse

The economical disposal of city rubbish has received much attention. A great many systems have been devised and some of them are working very successfully and at good profit in the reduction of garbage. Ashes are of no possible use except for filling in low ground. While very much experimenting has been done to recover the fibers from city rubbish, it has never been particularly successful. About the only way to recover paper stock from city rubbish is by the use of a belt. The stock is placed upon the belt, and as the belt passes along some of the valuable material is picked off, but all which remains is thrown upon a dump or burned in incinerators. This has never been successful, because only a small portion of the fibers are recovered. The cost of the labor for picking off these fibers has always offset the selling price of the stock.

For some time the Shartle Continuous Beater Company, of Middletown, Ohio, has been convinced that the machinery as designed by this company for removing foreign material from ordinary mixed papers, with a few modifications, could be adapted for the removal of paper stock from a large amount of foreign material, or rather, city rubbish. To demonstrate this, two car-loads of rubbish were shipped from Pittsburgh to Toronto, Ohio, where it was put through a system installed by this company in a paper mill. From the demonstration they were convinced that they could design a plant which would remove about 98 per cent of the fibers from city rubbish. The rubbish was not sorted except to take out large boxes or crates that might be collected by the wagons. The weight of the material was approximately 37,570 pounds.

The material was carried by the conveyor from the car to the third floor of the mill, the bale wire was taken off, and the material, containing wood and metals as well as paper stock and other refuse, was dumped down a chute into a breaker. Because of a right-angle turn in the pipe leading from the breaker to the settling trough, large pieces of wood were taken out by hand. After the material circulated with water, it went through an overflow in the breaker into an 18-inch pump, having a 16-inch ball and a 12-inch inlet and outlet. No trouble occurred due to tin cans or wood in this pump. From the pump the material went to a settling trough, approximately 30 feet long, 2 feet wide and 18 inches deep, and then went to a circular tank, where floating material was skimmed off by hand. The settling trough was cleaned occasionally, and from it tin cans, iron and dirt were obtained. From the circular tank the material went to two flat screens, approximately 20 feet long, in series, equipped with drags or scrubbers which scraped off any material that would not go through the screen plates. The paper stock which had been broken up fine enough went through the screen plates to a pulp thickener, and from there to the Jordan chest. The rags and material that would not go through the screen were scraped off into a continuous beater equipped with a perforated metal back fall. Here the rags were cut up and beaten and put through the beater to the chest. The material in the chest was pumped through two other intermediate chests and finally over the paper machine. This machine was of the cylinder type, with four cylinder molds having 18-inch trim, equipped with 30 dryers. The grade of paper made on this test was indented board for glass packing. Approximately 11,500 pounds of this material was obtained, making a total reclamation of slightly over 30 per cent paper stock.

At a reduction plant in Pittsburgh, a total reclamation of 16 per cent of this rubbish is generally obtained, but this includes metal and glass. Ordinarily only 7 per cent of paper stock is obtained at this plant, the remainder being burned in the furnace. The test, therefore, demonstrated that at least four times as much paper stock was obtained by this process as was ordinarily obtained by usual methods of sorting. It is to be noted that the equipment of the paper mill was built to use mixed papers and was adapted for that work. Certain improvements and changes should be made if it were to be used for dump stock. The further advantage of this method of reclaiming paper stock is that labor costs can be materially reduced, since only 15 men working in three shifts are needed if an ordinary wet pulp machine is used in place of the cylinder machine with dryers. At the plant of the reduction company in Pittsburgh, Pa., under normal conditions, approximately 100 men and 100 women are used, for this plant must run 24 hours a day to take care of the incoming rubbish from the wagons.

The cost of installing machinery for the purpose of reclaiming paper stock by this "flotation-sedimentation" method would not be very great, as it requires only a breaker, large pump, settling trough, large screen, pulp thickener, continuous beater, chest and wet pulp machine. This test, as made, was not an accurate one, and was merely an attempt to demonstrate what could be done. The weight of the baled rubbish was obtained from the reduction company and the weight of the finished paper was obtained from the back tender of the paper machine. Before the test was begun the chests were run out, and at the conclusion of the test all the material which came from the rubbish bales was run out and weighed as finished paper. This test was witnessed by representatives from the U. S. Bureau of Standards, and the greater part of this item was prepared from a report of the observer.

Nebraska's New Road Machinery

The shortage of men, materials and machines which may prevent many of the states from completing their road-building programs for 1920 is being felt in Nebraska, as it is elsewhere. As a result, the State Highway Department is concentrating considerable effort on

Modern and Serviceable

Modern ornamental street lighting renders various services of material benefit. First, it provides efficient illumination for your city. Second, it protects the lighted area from any possible crime. Criminals of all kinds prefer to work in the dark. They abhor light.

There are several other benefits to be derived from up-to-date street lighting, and if you are interested in maintaining the prestige of your city—if you are interested in creating civic pride—if you are interested in making a better city—send for our illustrated booklet.

APPEARANCE

Our ornamental lighting system is on the job 24 hours out of every 24. At night it lights up your business streets, residential sections, parks and boulevards. During the day the handsome poles greatly aid in beautyfying your city. There is nothing that can make a town more attractive than a neatly laid out system of ornamental street lighting.

Send your address for big descriptive booklet including many styles and designs.

KING MFG. CO.
53 W. Jackson Boulevard
CHICAGO, ILL.

"WEARPROOF" NO PARKING SIGNS

For every purpose, and any wording desired.

"Wearproof" Signs possess the countersunken lettering time will not obliterate. Also, Street Signs, Highway Markers, Semaphore Traffic Signs, Danger Signs, etc.

Write for new catalog.

UNION IRON PRODUCTS CO.
Drawer H
East Chicago, Indiana

The MURDOCK
PATENT ANTI-FREEZING
BUBBLE FONT

Is the only drinking fountain made that was designed and is built solely for outdoor use. It does not have to be turned off at the approach of cold weather.

THE ONLY FOUNTAIN MADE THAT IS STRONG ENOUGH TO WITHSTAND PUBLIC ABUSE.

Perfectly adapted for use on the Public Streets, in Parks, Playgrounds, School Yards, and all semi-exposed or uncertainly heated enclosures.

Write for fully illustrated literature to

The MURDOCK MFG. & SUPPLY CO.
(THE ORIGINAL HYDRANT HOUSE)
CINCINNATI, - - - - - OHIO
Builders of Water Service devices since 1853

When writing to Advertisers please mention THE AMERICAN CITY.

A TYPE OF HEAVY-BLADE GRADER FOR USE IN PUSHING AHEAD NEBRASKA'S 1920 ROAD-CONSTRUCTION PROGRAM

the construction of earth roads which later on may be converted into hard-surfaced roads. This means that even though the mileage of concrete or other hard-surfaced roads built during 1920 may not be great, the state's road program will be going steadily forward. When the time comes for the construction of the hard surface, much of the preliminary work will be out of the way.

As part of this program the state has just purchased 70 Mammoth graders from the Austin-Western Road Machinery Company of Chicago. These big machines, weighing 6,350 pounds each and having 12-foot blades, were delivered in time for the opening of the road construction season. They are being distributed among the majority of Nebraska's ninety counties and are accompanied by heavy tractors.

This buying of graders in wholesale lots is a usual practice and shows the progressiveness of the Nebraska Highway Department.

New Firm of Industrial Consultants

The announcement is made, through an 8-page pamphlet, of an advisory engineering and industrial consultant service of wide availability and great range of applications offered by the Technical Advisory Corporation, 132 Nassau Street, New York, including three officers and seven principal associates, all but one of whom were members of the Technical Advisory Committee of the U. S. War Claims Board, with many affiliated associates. The officers are Campbell Scott, President, and Ernest P. Goodrich and William D. Ennis, Vice-Presidents. The corporation does not undertake construction contracts or assume financial responsibility. In its industrial section it undertakes work as economists, cost reducers and business advisers, and in its engineering section it furnishes complete factory and institutional layouts and specifications and supervises the execution of plans.

An All-Round Mowing Machine

The new triple mower, manufactured by the Shawnee Mower Company, Shawnee-on-Delaware, Pa., shown in the accompanying illustration, is a machine which has brought forth a great deal of favorable comment from park superintendents and those in charge of large estates and golf courses. When it is necessary to cut a rough stretch of territory, this mower shows its particular advantage, as it can conform to the shape of the ground.

HORSE-DRAWN MOWER FOR CUTTING THE ROUGH IN PARKS OR LAWNS

Standardized and Engineered for Fire Service only

STUTZ

Fire Apparatus

Worthy of Your Consideration

STUTZ FIRE ENGINE CO.

Harry C. Stutz, President — Indianapolis, Ind., U.S.A.

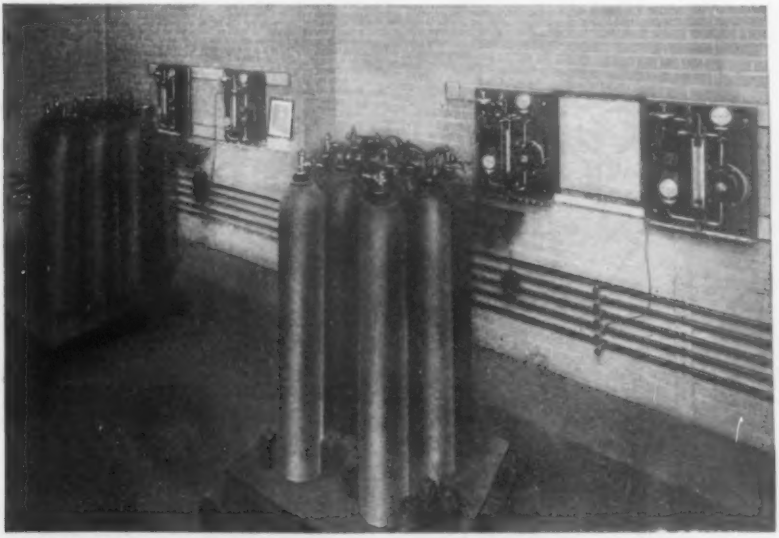
STUTZ
FIRE ENGINE CO.

Recent Addition to W. & T. Staff

The most recent addition to the rapidly increasing staff of Wallace & Tiernan Company, Inc., 349 Broadway, New York City, manufacturers of chlorine control apparatus, is Harold S. Hutton, who has been appointed District Sales Representative, with headquarters in the Commonwealth Building, Pittsburgh, Pa. Mr. Hutton is a sanitary engineer who has been connected with the Public Health Service. He succeeds P. O. Collins, who has been given indefinite leave of absence on account of illness.

Steel Bodies for Collecting Garbage

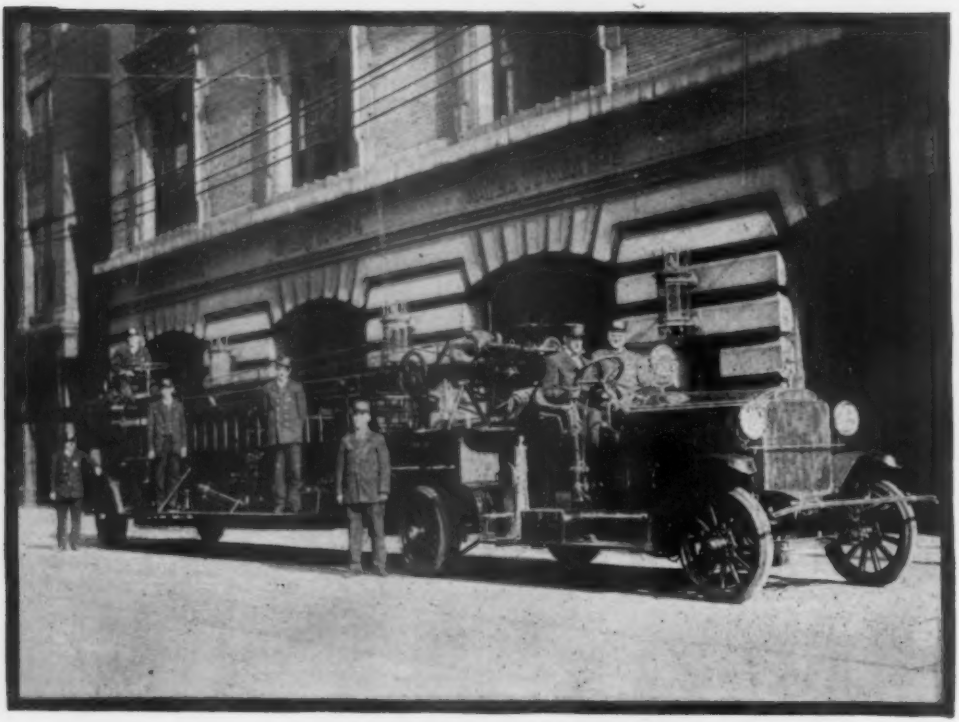
The increasing use of motor trucks for garbage collection, particularly where there are long hauls, has brought about some radical changes in the construction of the bodies to make them most suitable for this service. Madison, Wis., has recently placed in service two Winther chassis fitted with garbage bodies and hydraulic hoists for dumping them. The bodies and hoists are manufactured by the Heil Company, 1243 Twenty-sixth avenue, Milwaukee, Wis. The body has six covers. The four front covers open from the sides, and the two back ones from the rear. Adjustable steps on either side of the truck and in the rear make it easy to load the body. The bodies are made of No. 10 gauge steel, and the covers of No. 12 gauge. The bodies are first riveted and then all the seams are welded. This prevents the garbage from dripping on the street. The tailgate is hinged at the top so that it swings outward when released. Four wing nuts are used to keep it tightly in place when the body is loaded. Rubber packing is used between the tailgate and the body to insure a water-tight joint. The body itself is 3 inches wider at the rear than the front, so that the load will dump freely. The body is furnished with a Hydro hoist, the latest improved type of hydraulic hoist on the market. This hoist permits the body to be placed just back of the cab, thus utilizing all of the loading space and making possible a body with lower sides. The bodies have a capacity of 81 cubic feet. They are also made without covers, in which case loops are pro-



WALLACE & TIERNAN CHLORINATORS USED IN THE CATSKILL AQUEDUCT OF THE NEW YORK CITY WATER-SUPPLY

Worthington to Manufacture Improved Water-Power Machinery

The Worthington Pump and Machinery Corporation, 115 Broadway, New York City, has just announced that in addition to the well-known lines of hydraulic machinery which this company has manufactured since 1840, it has completed preparations to manufacture improved water-power machinery of all capacities for low, medium and high head service, including oil pressure systems, water wheel governors and other auxiliaries. It is entering this field equipped to produce hydraulic turbines to meet the highest standards in design, efficiency and workmanship. To supplement the present staff, familiar with hydraulic problems, the company has secured the services of competent designers having many years of successful experience. The Hydraulic Turbine Department will be glad to receive inquiries and to be of assistance in the solution of any hydraulic and water-power problems for municipalities or private companies.



A Quick Getaway

And No Lost Power on the Turns

EVERY man in the Fire Department knows what that means. And every property-owner learns its value to him, sooner or later.

Firestone Tires have proved themselves equal to the all-emergency demands of fire-fighting apparatus.

Most Miles *per* Dollar

Whether light or heavy, horse or motor driven, Firestone lengthens the life of the apparatus by a long term of years and definitely increases its dependability in action.

The following manufacturers of fire apparatus use Firestone equipment:

Ahrens-Fox Engine Co., Cincinnati, Ohio
American & British Mfg. Co., Providence, R. I.
American-LaFrance Fire Engine Co., Elmira, N. Y.
Robinson Fire Apparatus, St. Louis, Mo.
The Seagrave Co., Columbus, Ohio

FIRESTONE TIRE & RUBBER COMPANY
Akron, Ohio Branches and Dealers Everywhere

Firestone

WINTHER TRUCK USED BY THE CITY OF MADISON, WIS., FOR GARBAGE COLLECTION

vided so that a canvas cover can be tied over the load.

The Latest Development in Light-Weight Fire Apparatus

Municipalities and towns which have felt the least doubt regarding the value of light-weight fire apparatus, which heretofore has been solely of the chemical type, will be glad to learn of the new Childs triple combination hose, chemical and pump mounted on a Ford one-ton truck which is now manufactured by the O. J. Childs Company, Utica, N. Y. This new piece of apparatus retains all the valuable features of the Childs chemical truck and in addition carries a rotary fire pump specially designed to harmonize with the character of the power supply and the motor chassis as a whole.

The pump is of the positive displacement type, does not have to be primed, and will draw water a vertical height of 24 feet without the use of a foot valve. The pump is driven directly from the motor of the truck. The pump body is cast in one piece, reducing leakage to a minimum and practically eliminating vibration. The pump does not rack and strain the motor, but operates fast or slow, according to the speed of the motor. It is equipped with two suction and two discharge connections, one on each side of the car, thus making the apparatus very adaptable and eliminating all waste of time through having to turn the car around to face in the proper direction, as is the case with some of the larger engines. The pump is mounted under the driver's seat, the drive being taken at a point in the rear of the transmission of the car, so that the ratios in the car transmission are available in connection with the pump. There is a connection between the pump and the radiator so that cold water is provided constantly to keep the engine from overheating. The entire apparatus is simplicity in itself and can be readily operated by any man capable of running the regular Ford car.

Two lengths of suction hose of 12 feet each, with 3-inch internal diameter, fitted with special heavy suction couplings, are provided with the car, and one special heavy suction strainer is also included. The water pump also connects into the chemical line with a heavy brass piping with valves. This permits pumping water through the chemical hose for finishing up work or for putting out small fires resulting from flying sparks or embers. The hose body is of steel and has a capacity of 1,000 feet of single-jacket, 3½-inch fire hose, or 700 feet of double-jacket 3½-inch hose. The body has a slanted bottom and is well braced and strongly built throughout.

Bitulithic Pavement for Boston Parkway

The Park and Recreation Commission of Boston recently let the contract for the pavement of Jamaica Way, part of the extensive park system of metropolitan Boston, to Warren Brothers Company, Boston, Mass., for $29,290.90. This contract was awarded after bids had been asked for asphalt, bitulithic and Topeka pavements. The Mayor has approved this contract, and a statement has been issued that the success of bitulithic pavement throughout the city warrants the acceptance of this contract even though it was nearly $600 higher than the lowest bid for the work.

For heavy hauling and rough work, no other truck tire you can buy is equal to the Kelly-Springfield Caterpillar.

It is the first cushion type tire to be successfully used on trucks of all weights and sizes.

It gives resiliency without danger of puncture or blowout. It saves the engine and chassis, cuts down repair costs and lengthens the life of the truck.

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Enter the Six-Wheel Motor Bus

A pay-as-you-enter auto bus, patterned after the new type of street cars and capable of carrying 100 people, is being designed by the Goodyear Tire and Rubber Company, Akron, Ohio, as an experiment in broadening the field for the use of pneumatic truck tires, and will be operated in Akron. The new bus will have six wheels. It is the intention of the company later to equip the bus with eight wheels similar to the double trucks on street cars. Unfortunately photographs of the bus with its special passenger equipment are not available. The accompanying illustration, however, shows the arrangement of the six wheels, as the bus is now used with a commercial body.

The increased service of busses of this type, permitting the greatest cushioning of the load, thereby lessening the impact on the road, can be well appreciated by students of highway traffic. States now considering the passage of laws limiting the total weight of load and vehicle may have to reconsider their legislation in the light of the lessened load per inch of tire with the six-wheel bus, which is now a reality, and the eight-wheel bus or truck, which is promised in the near future.

A NEW DEVELOPMENT IN MOTOR BUS CONSTRUCTION WHICH INCREASES THE TOTAL LOAD, BUT DECREASES THE UNIT LOAD PER AXLE

Delaware Experiments with Bituminous Materials for Foundation and Surfacing

ONE of the great problems facing all highway departments to-day is whether it is more advisable to curtail road construction programs through diminishing the number of miles to be built in 1920 and 1921 or to change the nature of the surfacing from an expensive material, which it may be difficult to secure, to a less expensive material readily obtained.

In the case of Delaware there has been great trouble in securing cement shipments and there has been practically no difficulty in securing shipments of stone, sand or asphalt. At a conference held recently with the Chairman of the State Highway Department, it was decided that it would be very inopportune to retard the procedure of the 1920 program.

The original program covered approximately 80 miles of concrete highway. Only about half of this has been placed under construction. After carefully considering the present situation, it seemed somewhat doubtful about placing any more concrete highways under construction on account of the lack of cement shipments. Therefore it was agreed that the program should not be held up, but that the highway should consist of a bituminous foundation and an asphalt wearing surface. Plans are now being completed, and proposals will be called some time about the middle of August. There will be approximately 40 miles of road in this experiment. A smaller experiment consisting of approximately 15 miles of asphalt surface road was tried out in Sussex County, Delaware, and the results proved very gratifying to the users of these highways.

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